PRINTRONIX®

PrintNet™ User's Manual

The Printronix P5000 series of Line Matrix Printers
P5005B™, P5205B™, P5010™, P5210™, P5215™

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PrintNet™
User's Manual

164307-001, Rev. A

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1 *Introduction*

Overview

This chapter will introduce you to the PrintNet™ architecture and special features. It also provides information on installation and configuration tools.

What is the PrintNet?

The PrintNet Print Server allows you to attach printers on the LAN rather than attaching them directly to a host system. Following simple configuration steps, these peripherals can be simultaneously shared with users on the network whether TCP/IP, NetBIOS over TCP/IP, or IPX (Novell®).

The PrintNet package should contain a network interface card to attach itself and the printer to the network.

What Special Features are Available?

The PrintNet offers an extensive list of features including:

- Built-in HTML forms for easy cross-platform configuration
- a detailed and easy-to-use command shell built in to the firmware
- multi-level configuration security through passwords, permission levels, and access lists
- WAN-wide communication access
- numerous printer logging methods (e.g. automatic email) to record printer errors and usage

- remote management through HTML forms, Telnet sessions, "**`rsh/ rcmd/remsh`**" commands, SNMP, and pre-defined log methods
- extensive built-in troubleshooting tools
- built-in "**`telnet`**" and "**`ping`**" clients
- configurable memory usage by disabling protocols and destination services
- multiple destinations/queues for versatile printer manipulation and distinct print setups
- header and trailer strings to instruct printers on font, pitch, printing, etc.
- flexible naming conventions
- automatic network connection and frame type sensing
- simultaneous printing across all I/O ports and all supported protocols

Indicators

The PrintNet has three indicator lights, shown in Figure 1. These indicator lights can be seen at the rear of the printer. The LED patterns and the respective indications are given in Table 1. Refer to the Glossary for definitions.

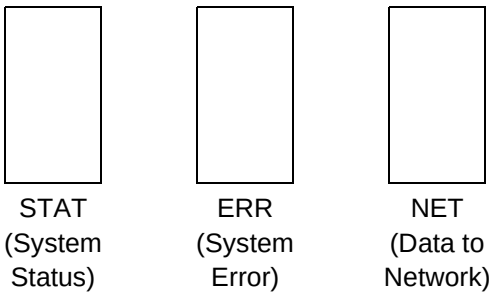

Figure 1. Status Indicator Lights

Table 1. LED Pattern Indications

STAT	ERR	NET	Mode
ON	OFF	ON	RAM Test
ON	OFF	OFF	ROM Test
ON	ON	OFF	EEPROM Test
OFF	ON	ON	Network Interface Test
OFF	OFF	ON	PRN1 Test
FLASH	OFF	FLASH	Run Mode
FLASH	ON	FLASH	Auto Reset Mode
FLASH	FLASH	OFF	Firmware Panic
ON	FLASH	ON	Hardware Exception

Operating Modes

The PrintNet has a self test and internally controlled modes. These are:

Power-on Self Test

The seven stage power-on self test performs diagnostic tests on the PrintNet processor, RAM, ROM, EEPROM, parallel ports, and network interface. The STAT, ERR, and NET LEDs indicate which test is currently in progress.

Run and Auto Reset Modes

Run Mode is the normal operating state of the PrintNet. Auto Reset mode is entered when the watchdog timer is triggered and the Print Server reset itself. In either mode, the STAT LED flashes differently depending on whether the unit IP address is configured. The Run Mode and Auto Reset Mode indicator descriptions are given in Table 2. Refer to the Glossary for definitions.

Table 2. Run Mode and Auto Reset Mode Indicator Descriptions

STAT	Rate	Indication
Flashes On	once per second	Normal Mode, IP address configured
Flashes On	2.5 times per second	Monitor Mode, IP address not configured
Flashes Off	2.5 times per second	Monitor Mode or Download Mode, IP address not configured
Flashes Off	once per 2 seconds	Download Mode, IP address configured

Conventions Used In This Manual

Command syntax and examples are formatted as follows:

- The Courier font in **boldface** indicates commands that you type.

`$ ping ftp.Printronix.com`

- Regular Courier font indicates displayed results.

`ftp.Printronix.com is alive`

- Variable values are shown in *italics* in command syntax, output, and in text.

`ping` ***`ipname`***
`ipname` `is alive`

2 *Installation and Configuration*

Installation

The PrintNet is unique in that different network connection options are available upon purchase. The base PrintNet model provides an RJ-45 connector for 10Base-T (UTP) networks. A 10Base2 version of the adapter is also available.

Connecting to the Network

To attach the PrintNet to the network as illustrated in Figure 2, you need to plug the network cable into the PrintNet connector.

Watch the LEDs in the rear of the printer as they cycle through the power on self test. When the test is complete, the STAT led is flashing.

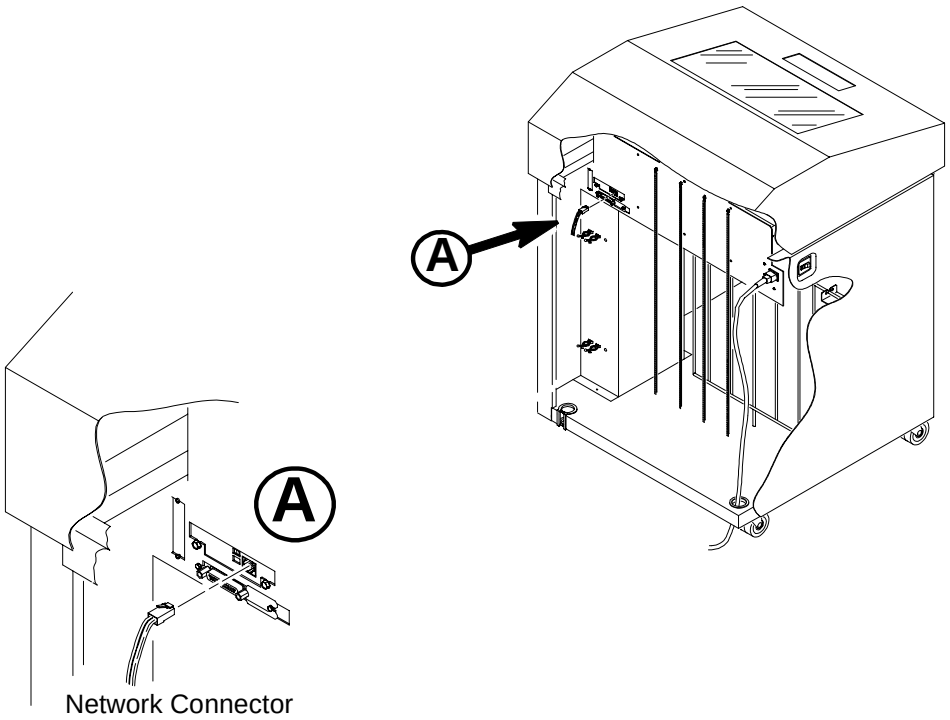

Figure 2. Physical Setup

Configuration Tools

There are two parts to a PrintNet setup:

1. Configuring the PrintNet so that it can be seen on the network. This involves network related settings (e.g. an IP address within TCP/IP environments) configured through the built-in command shell, npsh, or from the control panel.
2. Configuring a host with a new printer so it knows how to send data to the PrintNet. Just being able to see the printer on the network does

not mean you can automatically print to it. A host has to be told where to send the data.

NOTE: Some network environments do not require any network settings to be configured on the PrintNet. However, all network setups require configuration on the host end.

IPAssign

This is a Windows® utility that helps identify the PrintNet on the network. Relying on TCP/IP as the underlying protocol, the print server can be assigned an IP address and subnet mask, once it is detected on the network. When this is completed, other tools like the HTML configuration forms can be used to do additional configuration.

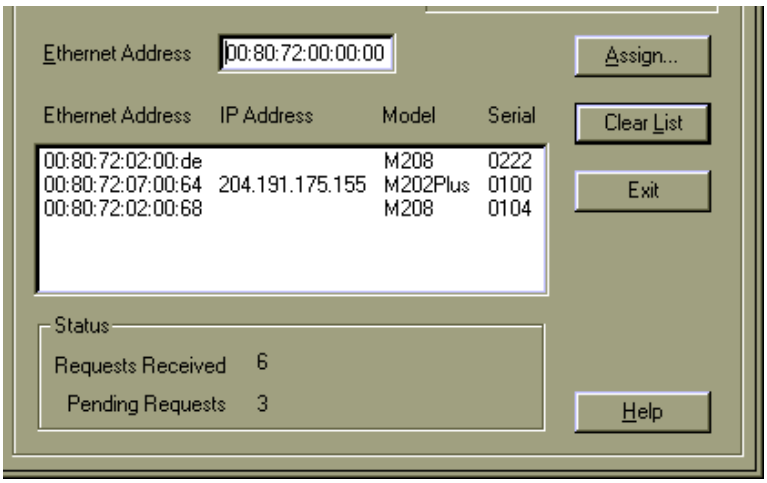

Figure 3. IPAssign Sample Interface

HTML Forms

The PrintNet settings can be configured over TCP/IP through a standard Web browser. The PrintNet Web pages provide a handy way to access some of the commands built in to the print server.

NOTE: If a router is used, make sure a gateway value is configured.

To access the PrintNet home page:

1. Make sure the print server has an IP address and subnet mask so it is recognizable on your TCP/IP network.
2. Make sure your network station can successfully "**`ping`**" the PrintNet over the network.
3. Direct your Web browser to the Uniform Resource Locator (URL) "**`http://`*`IPaddress`*** " (e.g. "**`http://192.75.11.9`**").

The PrintNet HTML structure is divided into several menus as shown in Figure 4.

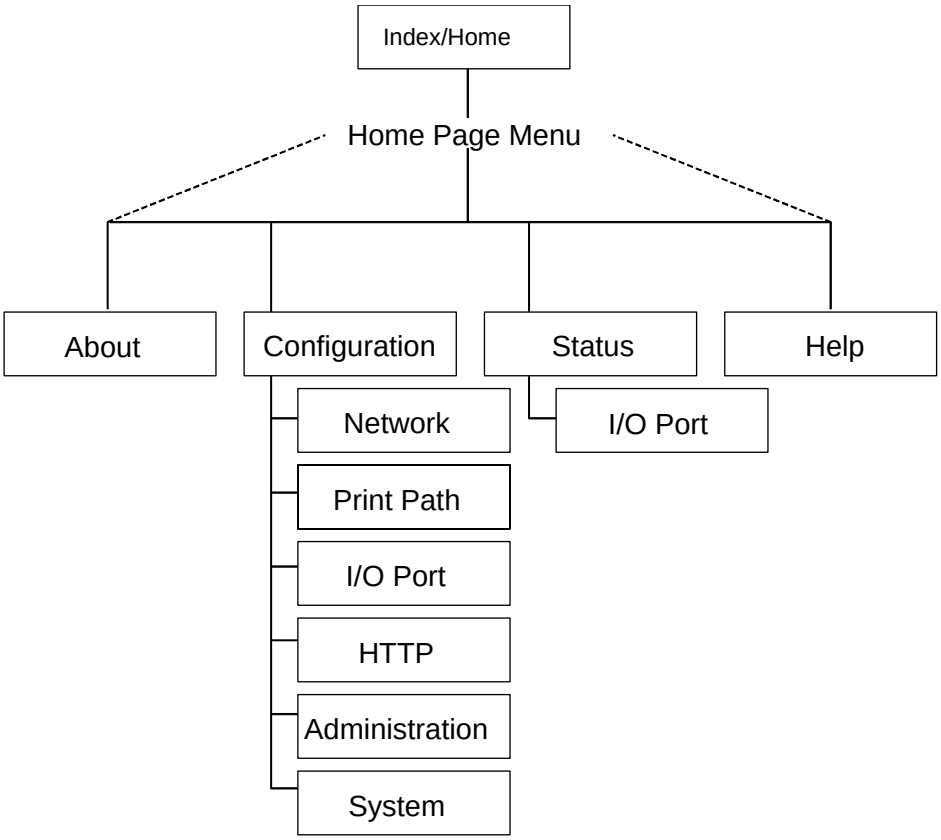

Figure 4. PrintNet HTML Structure

NOTE: Online help is available for all HTML pages.

Printer Status Screen

Using the printer IPAddress and any standard web browser, you can check the status of the printer. Figure 5 shows the exact state of the printer by showing the printer LCD message.

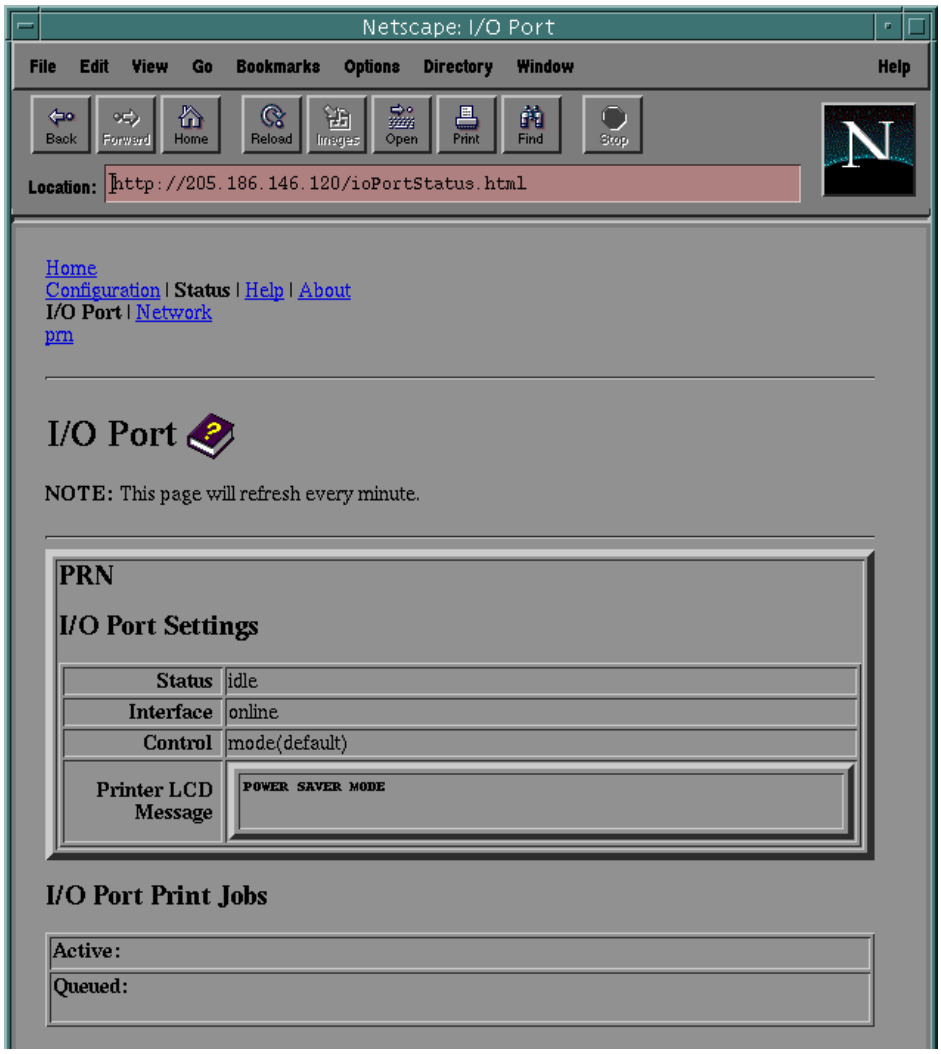

Figure 5. WWW Printer Status Screen

Configuration Alternatives

Besides the HTML forms and software provided, the PrintNet internal command shell, npsh, can also be reached using these methods:

Telnet

A TCP/IP command that helps configure PrintNet settings remotely. A TCP/IP host starts a Telnet session with the print server and logs in to the device command shell to alter and view settings.

Example:

```
telnet 192.75.11.9
```

Remote Shell

(e.g. "**`rsh`**" "**`rcmd`**" "**`remsh`**") A TCP/IP command that helps configure print server settings remotely. A TCP/IP host uses this command to remotely execute a single command on the PrintNet.

Example:

```
rsh spike list prn
```

This command remotely executes the npsh command "**`list prn`**" on the PrintNet named **spike**.

Control Panel

The IP Address, Gateway Address, and Subnet Mask can all be set from the control panel.

IMPORTANT **If the change is made from the control panel, make sure not to cycle power for a minimum of two minutes after the printer has gone online. A loss of PrintNet configuration information could occur.**

Chapter 2 Configuration Tools

3 *Windows Configuration*

Overview

This chapter details a complete Windows configuration setup including:

1. Identifying the PrintNet on the network using TCP/IP as the underlying protocol
2. Configuring the PrintNet with its mandatory TCP/IP settings (IP address and subnet mask)
3. Configuring a new printer on the Windows station

Environment Description

The PrintNet supports network printing under Windows environments by using TCP/IP. In a Windows NT® setup, pure TCP/IP is used as the network protocol whereas with Windows 95®, NetBIOS over TCP/IP is used.

Figure 6 shows two of the most common Windows setups you will see with the PrintNet. The ideal configuration is a network printer defined on the NT server to be shared by Windows 95 clients. However, any Windows station can also go directly to the PrintNet.

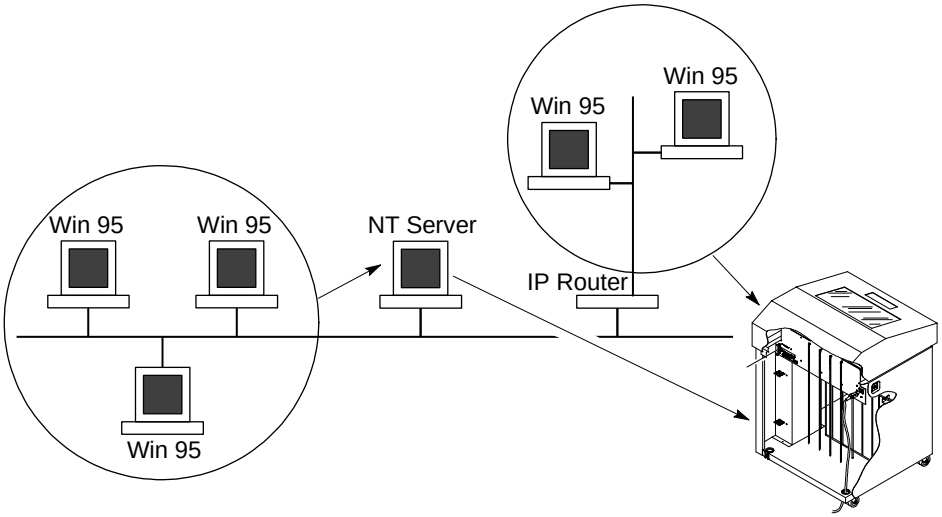

Figure 6. Windows Integration

PrintNet Configuration

There are mandatory TCP/IP settings (IP address and subnet mask) needed before the print server can be detected on the network. There are also additional settings which are optional. This section offers alternative methods for configuring your PrintNet in a Windows environment and mentions some of the more common optional settings available.

Mandatory

Since TCP/IP is used for Windows printing, the PrintNet must be configured with a minimum of an IP address and subnet mask before it can be seen on the network.

Optional

Additional settings, like routing entries, can be configured. This allows communications across subnets.

Configuration of the PrintNet can be done from the printer control panel, IPAssign, Web browser, or host commands.

Configuration Using the Control Panel

You can set any of three listed parameters from the printer control panel. These parameters are located in the Ethernet™ Parameters menu. The available parameters are:

- IP Address
- Gateway Address
- Subnet Mask

The procedure for changing any of the parameters is the same. The procedure for changing the IP Address is given here as an example. Use the same procedure for the other required parameters. To change the IP Address parameter:

1. Make sure the printer is on and raise the printer cover.
2. Press the ON LINE key to place the printer in the OFFLINE mode.
3. Unlock the ENTER key. Refer to the *User's Manual* for instructions.
4. Press the LEFT or RIGHT arrow key until the LCD displays "ETHERNET PARAMS."
5. Press the DOWN arrow key to access the "IP Address" parameter.
6. Press the DOWN arrow key to view the current IP Address.
7. Press the DOWN arrow key to access the portion of the IP Address to be changed.
8. Press the LEFT or RIGHT arrow key to change access to the portion of the IP Address to be changed.
9. Press the DOWN arrow key to select the portion of the IP Address to be changed.

10. Press the LEFT or RIGHT arrow key to select the desired value.
11. Press the ENTER key to make the selection. An asterisk appears to the right of the value.
12. Press the UP arrow key and you will be returned to step 8.
13. When you are finished changing parameters, exit the configuration menus and lock the ENTER key. (Refer to your printer's *User's Manual* for details.)

Configuration Using IP Assign

NOTE: You must have the TCP/IP protocol and services enabled on this windows station first.

To configure an IP address and subnet mask on your PrintNet:

1. Insert the diskette labeled "IPAssign" into the floppy drive.
2. Load the File Manager or WinFile and look under the floppy drive for an IPAssign self-extracting file.
3. Double click on the IPAssign file to launch the install program.
4. When prompted to install, click on YES to load the InstallShield Wizard.
5. Answer the prompts throughout the wizard.
6. Once the install process is complete, you will be prompted to view the "ReadMe" file. Select "Yes" to read this. Close the file when done.
7. Find the new IPAssign program group and double click on the "IPAssign" icon to load the program.

NOTE: IPAssign will search the network to find the correct device. This may take several minutes. For larger networks, you may speed the process by powering the printer off and then on again.

8. At the “IPAssign” main dialogue box that appears, you should see an entry for your PrintNet appear in the list box. Figure 7 shows an example screen.

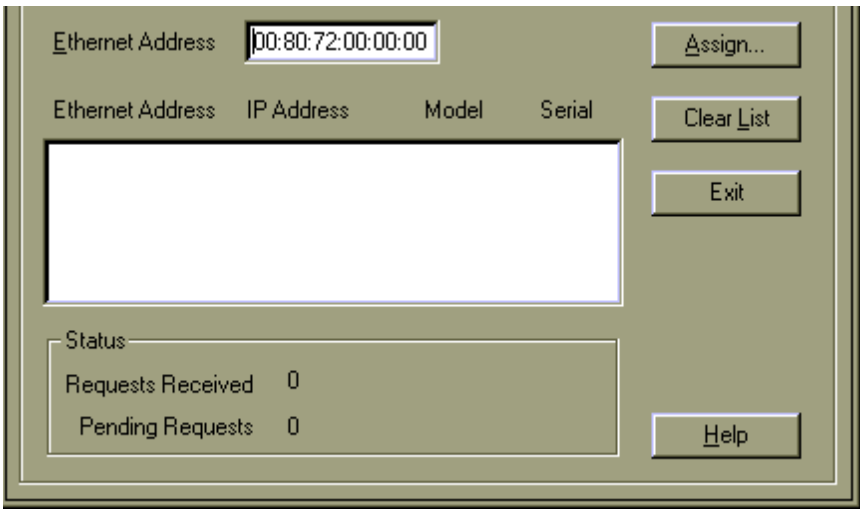

Figure 7. IPAssign Main Screen

9. Once your PrintNet ethernet address appears in the list box, select it and click on ASSIGN.
10. At the “Assign IP” dialogue box that displays next, fill in the IP address and subnet mask for this PrintNet.

NOTE: You can also assign a default router/gateway entry within this dialogue box allowing your PrintNet to communicate across subnets. This is optional.

11. Click SET when done to assign these TCP/IP settings to the PrintNet. IPAssign will then display two dialogue boxes informing you of its progress.
12. Once you see the message about successfully assigning the settings, click OK. These TCP/IP settings are now in the PrintNet current memory, to be retained until the next power cycle.

13. If you want to store the TCP/IP settings into the PrintNet flash memory via a browser, click on LAUNCH BROWSER at the next window that displays. This will prevent you from losing the settings after a power cycle. If not, click “No.”
14. Read the text in the “Configuration Information” window that displays and click OK to launch your Web browser.

NOTE: If you are returned to the IPAssign main dialogue box, you will be unable to launch your browser this way. Please load it manually and go to the URL, “**`http://PrintNetIPaddress/networkConf.html`**” (e.g. “**`http://192.75.11.9/networkConf.html`**”) or use a Telnet server: “Telnet *IP_address*.”

15. Once your Web browser is loaded and you are prompted for a “User ID,” type “**`root.`**”
16. At the “Password” prompt, press ENTER since there is no default password configured and click OK.
17. At the “Network Configuration” HTML form that displays, fill in the PrintNet IP address under the “IP Address” field. Figure 8 shows an example configuration form.
18. Click in the field labeled “Subnet Mask” and fill in the PrintNet subnet mask.

NOTE: If you would like to communicate with the PrintNet from across routers, you will need to fill in an entry within the “Routing” section. Please see “Communicating Across Routers” on page 32 for more details.

19. Click on the SUBMIT button when done.
20. Turn the printer off, then on again so the changes take effect, or click on the “System” link at the top of the “Network Configuration” HTML form. Once at the “System” form, click on the REBOOT button.

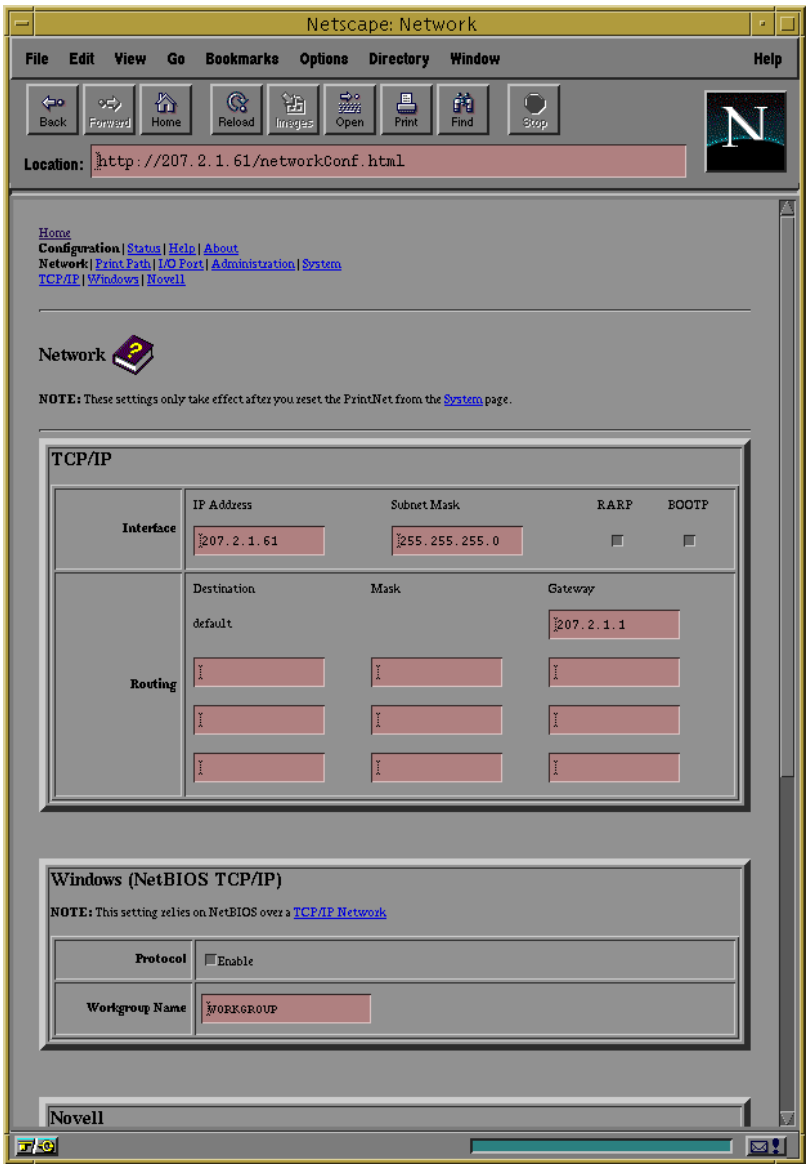

Figure 8. Network Configuration HTML Form

At this point, the TCP/IP settings are stored in flash memory and you should be able to see the PrintNet on your Windows network. However, you can not print to it yet since you have not identified the network printer to your Windows station. Refer to “Host Configuration” on page 35 to identify the network printer to the Windows station.

Configuration Using ARP

To configure the PrintNet with its IP settings using a manual “**arp**” command:

1. Log on to a Windows station with TCP/IP loaded and located on the same subnet as the PrintNet.
2. Find the Ethernet address for the PrintNet on the configuration printout. It must be entered as part of this procedure.
3. Use the “**arp**” command to add an entry into the Windows station ARP table for the PrintNet. This is the most common syntax for this command:

Syntax:

arp -s *ipaddress ethernetaddress*

Example for Microsoft TCP stacks:

arp -s 192.75.11.9 00-80-72-07-00-60

This example specifies a PrintNet using IP address **192.75.11.9** and Ethernet address **00:80:72:07:00:60**.

4. Check to see if the ARP entry was accepted.

arp -a

You should see an entry in the listed ARP table with the IP address and Ethernet address specified in Step 3.

5. Try to “**ping**” this IP address to see if the PrintNet can be seen on your network.

At this point, you should be able to communicate with the PrintNet from your local Windows station. This means the print server knows about an IP address and subnet mask and has these settings in its current memory. However, if the PrintNet is power cycled, these settings will disappear unless you store them into flash memory. To do this:

1. Load a Web browser on your Windows station and direct it to the URL "**`http://`*`PrintNetIPaddress`*`/networkConf.html`**" (e.g. "**`http://192.75.11.9/networkConf.html`**").

NOTE: If prompted for a "User ID" and password first, type "**`root`**" for the ID and press ENTER at the password prompt since there is no password by default.

2. At the "Network Configuration" HTML form that displays, click in the field below the "IP Address" heading and type in the IP address for the PrintNet.
3. Under the "Subnet Mask" heading, enter the PrintNet subnet mask.

NOTE: If you would like to communicate with the PrintNet from across routers, you will need to fill in an entry within the "Routing" section. Please see "Communicating Across Routers" on page 32 for more details.

4. Click on the SUBMIT button when done and physically repower the printer to make the new settings take effect.

Communicating Across Routers

Since Windows environments rely on TCP/IP to communicate with the PrintNet, crossing routers becomes an issue.

After following one of the PrintNet configuration methods mentioned, you will most likely only be able to communicate with the print server from the same subnet. This means any hosts across a router will not be able to see your PrintNet. In order for hosts across a router to see your PrintNet, it is best to store a default router/gateway within the print server so that any packets destined for another subnet get forwarded to this router automatically. The router (or series of routers) can then take over ensuring the packets get to their final destination on another subnet on your network.

To configure a default router/gateway within the PrintNet:

1. Load a Web browser on your Windows station and direct it to the URL "**`http://`*`PrintNetIPaddress`*`/networkConf.html`**" (e.g. "**`http://192.75.11.9/networkConf.html`**").

NOTE: If prompted for a "User ID" and password first, type in "**`root`**" for the ID and press ENTER at the password prompt since there is no password by default.

2. At the "Network Configuration" HTML form that displays, click in the first field below the "Gateway" heading and type in the IP address of the default router/gateway for the PrintNet subnet.
3. Click on the SUBMIT button when done and physically repower the print server to make the new settings take effect.

Changing Workgroup Names

Windows environments define groups of related computers as "workgroups." By default, the PrintNet belongs to the workgroup called "WORKGROUP." However, you may want to change this to suit your network better. To do this:

1. Load a Web browser on your Windows station and direct it to the URL "**`http://PrintNetIPaddress/networkConf.html`**" (e.g. "**`http://192.75.11.9/networkConf.html`**").

NOTE: If prompted for a "User ID" and password first, type in "**`root`**" for the ID and press ENTER at the password prompt since there is no password by default.

2. At the "Network Configuration" HTML form that displays, search for the "Windows (NetBIOS TCP/IP)" section and highlight the "Workgroup Name" field.
3. Type in the new workgroup name for the PrintNet.
4. Click on the SUBMIT button when done and physically repower the print server to make the new settings take effect.

Changing Destination Names

When defining some printers within Windows environments, the PrintNet requires that you specify a pre-defined destination rather than any name you would like. For example, when creating a new printer under Windows NT, you are presented with a screen similar to Figure 9.

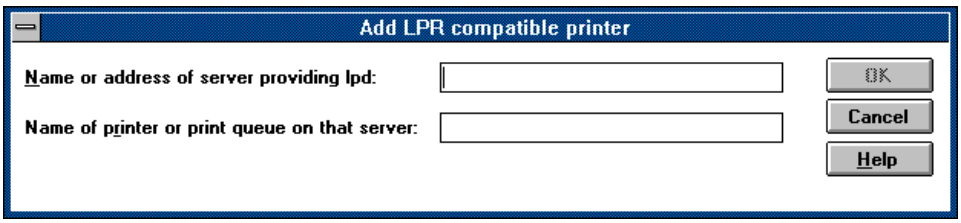

Figure 9. Windows NT Print Setup Dialogue Box

The first field requires the IP address for the PrintNet and the second field must be filled in with an existing destination from the print server (e.g. d1prn). Otherwise, the PrintNet will not accept this as a valid network printer. Table 3 outlines the default destinations to choose from.

Table 3. PrintNet Default Destinations

Destination	Mapped I/O Port
d1prn	PRN
d2prn	PRN
d3prn	PRN
d4prn	PRN

This name can be changed to something more meaningful using the built-in HTML forms. To do this:

1. Load a Web browser on your Windows station and direct it to the URL "**`http://PrintNetIPaddress/destConf.html`**" (e.g. "**`http://192.75.11.9/destConf.html`**").

NOTE: If prompted for a "User ID" and password first, type in "**`root`**" for the ID and press ENTER at the password prompt since there is no password by default.

2. At the "Print Path Configuration" HTML form that displays, select a destination link from the top of the page to bring up the appropriate destination form. By default, you should see a line near the top of the form showing the destinations listed in Table 3.
3. Once the desired destination HTML form displays, highlight the "Name" field and type in the new name for this destination.
4. Click on the SUBMIT button when done and physically repower the print server to make the new setting take effect.

Host Configuration

This section covers Windows NT and Windows 95, Windows 3.1 and Printronix Printing System (PPS) new printer setups.

Windows NT 3.51 Host Setup

To configure a new printer on a Windows NT 3.51 station:

1. Open the “Control Panel.”
2. Double click on “Printers.”
3. Select “Create a Printer” from the “Printer” menu to display the dialogue box in Figure 10.

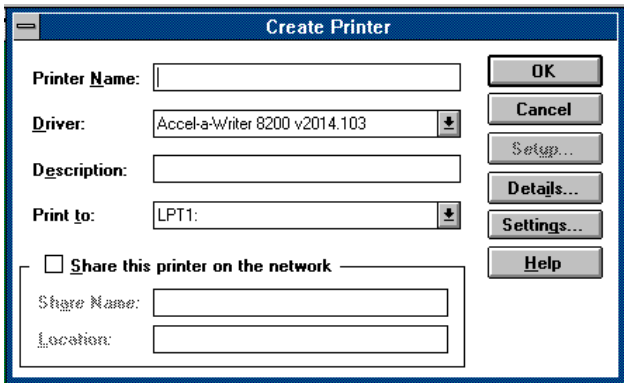

Figure 10. Create a Printer Dialogue Box

4. Define a name to represent this print setup and select the appropriate driver for the printer that will be used in this setup. For printer driver choose “generic text” or Epson “FX1050” or “Proprinter” based on print need.
5. Under the “Print To” field, select “Other...”

6. Select “LPR Port” from the list that displays and click OK to bring up a dialogue box similar to the one found in Figure 11.

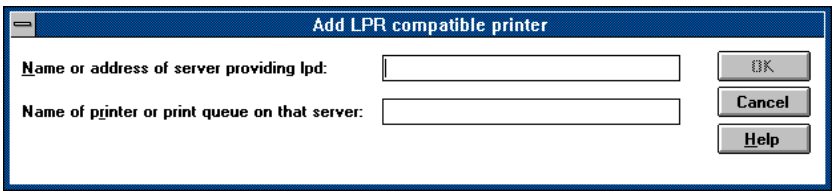

Figure 11. Add LPR Compatible Printer Dialogue Box

7. Type in the IP address or host name of the PrintNet in the first field.
8. Type in the name of a pre-defined destination/queue on the PrintNet in the second field.

NOTE: This name must be a name of an existing destination/queue on the PrintNet and it must be lowercase by default. You will probably use “**`d1prn`**”.

9. Click OK when done specifying these two fields.

You now have a new network printer which relies on the standard TCP/IP print protocol, LPD, to print remotely to a printer with the PrintNet.

Windows NT 4.0 Host Setup

There are many different configurations available for the Windows NT 4.0 printer setup. The setup shown here is used only as an example of the procedure. To configure a new printer on a Windows NT 4.0 station:

1. Select “Settings:Printers” from the “Start” menu.

2. Double click on the “Add Printer” icon. The “Add Printer Wizard” window is displayed.

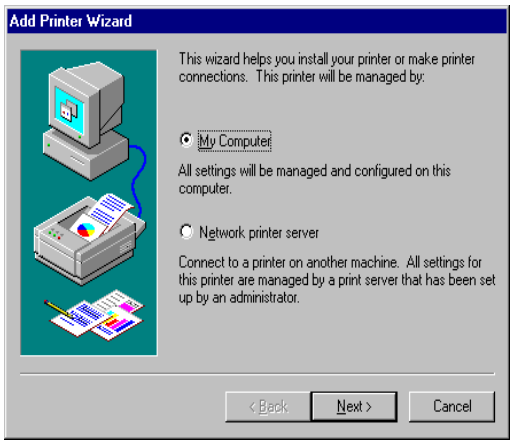
Add Printer Wizard
This wizard helps you install your printer or make printer connections. This printer will be managed by:
My Computer
All settings will be managed and configured on this computer.
Network printer server
Connect to a printer on another machine. All settings for this printer are managed by a print server that has been set up by an administrator.
< Back
Next >
Cancel

Figure 12. Printer Management

3. Select “My Computer” from the second window of the “Add Printer” wizard that loaded.

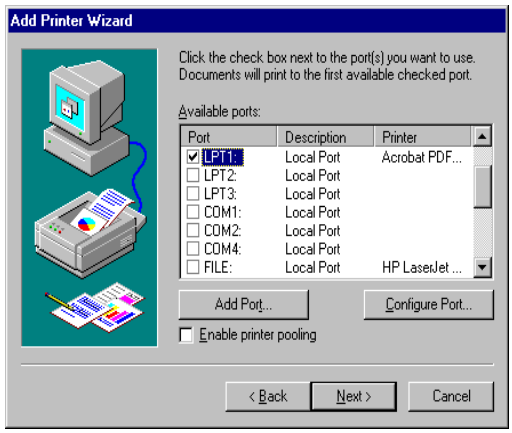

Figure 13. Available Printer Ports

4. At the next window, click the box next to the port you want to use.

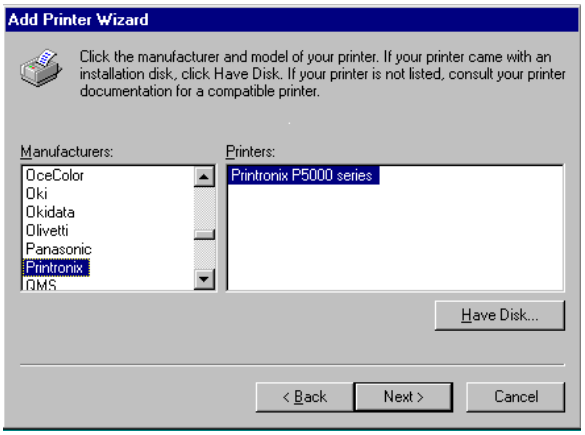

Figure 14. Manufacturer and Model

5. At the next window, click the manufacturer and printer model.

NOTE: If the Printronix printer driver is not installed, it must be downloaded from the Printronix web page at www.printronix.com. When the driver has been saved to the drive, click on “Have Disk” and “Browse” to the correct location for the driver.

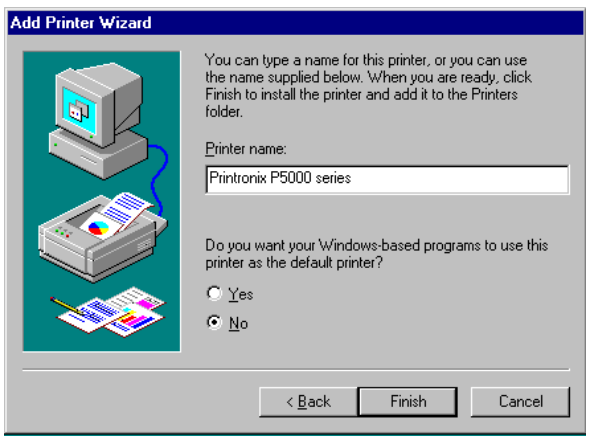
Add Printer Wizard
You can type a name for this printer, or you can use the name supplied below. When you are ready, click Finish to install the printer and add it to the Printers folder.
Printer name:
Printronix P5000 series
Do you want your Windows-based programs to use this printer as the default printer?
Yes
No
< Back
Finish
Cancel

Figure 15. Identifying the Printer

6. At the “Printer name” dialogue box, enter the name of the printer as you would like it displayed for printer selection. It is also possible to choose this printer as the default.

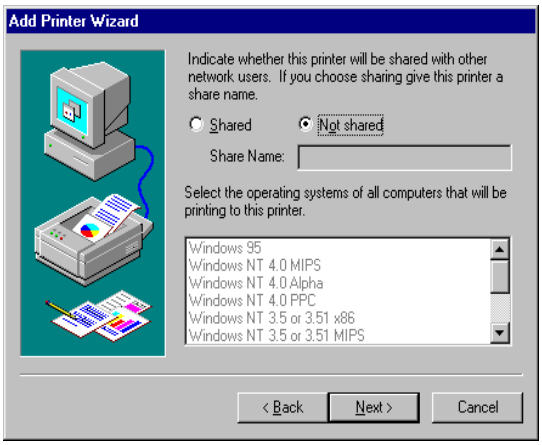
Add Printer Wizard
Indicate whether this printer will be shared with other network users. If you choose sharing give this printer a share name.
Shared
Not shared
Share Name:
Select the operating systems of all computers that will be printing to this printer.
Windows 95
Windows NT 4.0 MIPS
Windows NT 4.0 Alpha
Windows NT 4.0 PPC
Windows NT 3.5 or 3.51 x86
Windows NT 3.5 or 3.51 MIPS
< Back
Next >
Cancel

Figure 16. Shared Printer

7. On the next wizard page presented, determine if the printer is shared with other network users. If it is shared, the shared name must be entered and the operating system of shared systems must be selected.

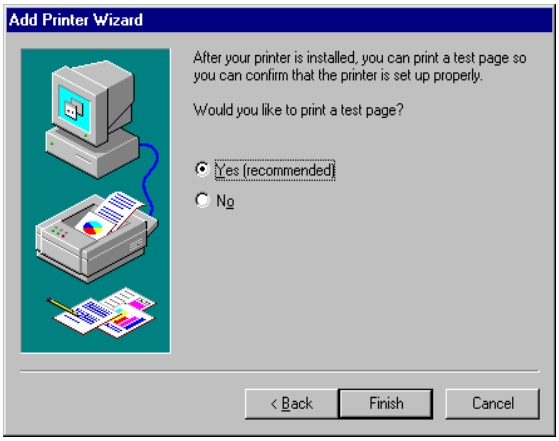
Add Printer Wizard
After your printer is installed, you can print a test page so you can confirm that the printer is set up properly.
Would you like to print a test page?
Yes (recommended)
No
< Back
Finish
Cancel

Figure 17. Print Test Page

8. The final step in the installation process is to determine if you would like to produce a test print. As indicated on the printer wizard display, this test print is recommended.

Windows 95 Host Setup

To configure a new printer on a Windows 95 station:

1. Select “Settings:Printers” from the “Start” menu.
2. Double click on the “Add Printer” icon.
3. Select “Network Printer” from the second window of the “Add Printer” wizard that loaded.
4. At the next window, click on BROWSE to help fill in the network path of this printer.
5. At the “Browse for Printer” dialogue box that displays, double click on the appropriate workgroup containing the PrintNet. By default, the print server falls under the workgroup, “WORKGROUP.”
6. Continue searching the network until you see the PrintNet name, “M_*xxxxxx*”, where “*xxxxxx*” equals the last six digits of the print server Ethernet address found when a configuration is printed.
7. Once you see the PrintNet, double click on it to display a list of pre-defined destinations/queues to choose from.
8. Select a destination/queue that will use “**`d1prn`**”.
9. Click OK once you have selected a destination.
10. Back at the network path window, select NEXT since this path should now be filled in for you.
11. At the next window, select the appropriate print driver and click on NEXT.
12. Fill in a name for this new network printer at the next window and decide if you want this to be the default printer. This printer name can be anything you would like as long as it is unique.
13. When prompted for a test page, select either “Yes” or “No” depending on the state of the attached printer and click on FINISH.

NOTE: Windows may ask for a disk or CD-ROM to load the appropriate printer driver to complete this new printer setup.

There should now be a new printer icon within the “Printers” folder. This new network printer relies on NetBIOS over TCP/IP as the underlying protocol to print to the PrintNet.

Printronix Printing System (PPS) Host Setup

To configure a new PPS printer on a Windows station, you will need to:

1. Insert the diskette labeled “PPS” into the floppy drive.
2. Load the File Manager or WinFile and look under the floppy drive for a PPS ZIP file.
3. Double click on the PPS ZIP file to extract all files within it to a directory on the Windows station.
4. Once extracted to a directory, find the “Setup” file and double click on this to load the InstallShield Wizard.
5. Answer the prompts throughout the wizard and select “Yes” to restart your computer at the end.
6. Once your computer is rebooted, open the Settings:Printers folder to view your existing printers.

NOTE: PPS will only work with an existing printer. Therefore, if you do not have an existing printer that you can alter, create one now using any port settings you would like. These will be changed in the following steps.

7. Select the printer that you want to use with PPS and click the right mouse button to bring up a sub-menu.
8. Select “Properties” from this menu to display the current settings for this printer.
9. Click on the “Details” tab to display the printer port settings.
10. Click on the ADD PORT button.
11. At the “Add Port” dialogue box that displays, click on the button labeled “Other.”
12. Click on “TCP/IP Printer Port” within this “Other” list.

13. At the next dialogue box that displays, fill in the host name or IP address of the PrintNet in the first field.
14. Fill in a valid TCP port number on the PrintNet in the second field. The choice is **4400** or **9100** for PRN.
15. Click OK when done to return to the “Details” window. You should now see something relating to “PPS Port” within the “Print to the following port:” field.
16. Click OK to close this printer properties window.

You now have a new network printer which relies on PPS to print remotely to a printer off of the PrintNet.

Windows 3.1 Host Setup

If you are running Windows 3.1 stations on your network, you will need to rely on either TCP/IP or IPX to print to the PrintNet. If IPX is used, you will have a print queue defined on a Novell file server which your Windows 3.1 stations will send their print jobs to. The PrintNet will then service this print queue as either a PSERVER or an RPRINTER. Please see Chapter 5, “Novell Configuration” for further details.

If you want to rely on TCP/IP, you will need a third party TCP stack loaded onto your Windows station since TCP/IP support did not automatically come with Windows until the introduction of Windows NT and Windows 95. You may also be running a third party stack if you decided not to use a Microsoft® operating system.

Some common TCP stacks are FTP Software's® OnNet, NetManager's® Chameleon, and Frontier Technologies'® SuperTCP. In each case, they allow your Windows 3.1 station to communicate with other TCP/IP devices. This means you can send print jobs to the PrintNet as well.

The most common print method offered with Windows TCP stacks is LPR/LPD, a multi-platform remote printing protocol used on everything from PCs to mainframes. The LPR print setup is very simplistic, involving only two parameters:

1. **PrintNet IP address.** The IP address or host name of the print server you want to print to.

2. **PrintNet destination/queue.** A pre-defined name on the print server telling the device which I/O port to send the jobs to. The standard name for the PRN port is "**`d1prn`**".

NOTE: This destination name is case sensitive and by default, all names are lowercase.

Troubleshooting Tips

This section provides information on possible solutions to some standard configuration errors. If you require technical support, please have as much of the following information as you can available when you call:

1. What level of software are you running?
2. What type of attachment do you have?
3. What is your host operating system?
4. Give a detailed description of the problem.
5. How often, and when, does the problem occur?
6. Give a detailed description of your network and the components attached.

Please follow these tips to determine what the problem may be with your PrintNet configuration.

IPAssign Cannot Find the PrintNet

- Have you loaded IPAssign onto a Windows station on the same subnet as the PrintNet? IPAssign can not see print servers across routers unless BOOTP broadcast packets can travel from subnet to subnet.
- Have you waited several minutes for IPAssign to recognize the PrintNet or have you repowered the printer to speed this identification process?
- Do you have a DHCP, RARP, or BOOTP server running that may be providing the PrintNet with an IP address upon bootup? If so, IPAssign is not needed to assign an IP address to the print server.

NOTE: If the PrintNet has an IP address, it will no longer send out a BOOTP packet. This means IPAssign will not be able to see the device on the network.

PrintNet Will Not Talk on the Network

- Have you assigned it a unique and valid IP address which corresponds with the other IP addresses on your network? For example, are you sure no other device is using this IP address?
- Are you sure you are trying to talk to the PrintNet from a Windows station on the same subnet? Currently, the print server can only be seen locally unless you configured a routing entry earlier.
- If you look at the back of the printer, is the STAT LED flashing once a second or is it quicker than that? A slower, once-a-second rate tells you that the print server is in fact configured with an IP address. A faster rate says it knows nothing about this so you may need to try the configuration process again.
- Have you confirmed that the network connection to the PrintNet is working correctly? Trying different network cables and locations will help narrow down the problem.

HTML Configuration Forms Will Not Display

- Can you "**`ping`**" the PrintNet from your Windows station? If not, please refer to "PrintNet Will Not Talk on the Network" above.
- Have you used the correct URL for the PrintNet home page? It should be "**`http://`*`PrintNetIPaddress`***" (e.g. "**`http://192.75.11.9`**").

Errors Occur when Defining an LPR Printer

- Can you "**`ping`**" the PrintNet from your Windows NT station? If not, please refer to "PrintNet Will Not Talk on the Network" above.
- Did you specify the correct IP address or host name for the PrintNet in the first field of the "Add LPR Compatible Printer" box?

- Did you specify a valid destination/queue on the PrintNet in the second field of the “Add LPR Compatible Printer” dialogue box? If so, did you also enter it in lowercase letters?

Can Not Browse the PrintNet on the Network

- Have you looked under the right Windows workgroup? By default, the PrintNet will be found under “WORKGROUP.”
- Are you able to browse other Windows stations and devices on the network from this same station?
- Has this Windows station been given enough time to update its registry so it can see this newly added workgroup device? Sometimes Windows stations can take considerable time, depending on the size of the network.

Printer Errors when Printing or No Output

- Is there a large job currently printing taking up all of the printer resources? Usually when printing from Windows 95 stations, a busy printer can cause Windows to display a printer error message. This is because it demands immediate printer attention rather than holding the data until the printer is ready again. The best way around this is to use a central spooling station like an NT server.
- Have you tried restarting the spooler under Control Panel:Services? Sometimes this is needed to get printing started.

NOTE: As a last resort, you may want to reboot the Windows station. Sometimes this is the only option to completely clear this situation. The PrintNet usually has nothing to do with this problem.

TCP/IP Access Problem

If you can "**`ping`**" the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the PrintNet, there may be an incorrect entry in the TCP access list. In order for this workstation to use the PrintNet interface in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.
2. All entries must be deleted from the TCP list to grant all workstations/ hosts access to the above TCP services.

To view the current access list:

Use the printer control panel to access the configuration menu (see the *User's Manual* for configuration menu information). From the DIAGNOSTICS/Printer Tests menu choose the E-net Test Page. When the page prints, look under the "TCP ACCESS TABLE" section for the TCP access list entries.

To add/delete a TCP access list entry, refer to "TCP Access Lists" on page 121.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the control panel. See the *User's Manual* for configuration menu information.
2. Power off the printer.
3. On the PrintNet Interface, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the PrintNet Interface, place SWITCH 2, the center switch, in the up position.

6. From a workstation attached to this network segment, create an ARP entry. The PrintNet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```

7. Try to "**ping**" this IP address to see if the PrintNet can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.
8. Telnet into the PrintNet using the same IP address as above. Log in as root with no password.
9. At the system prompt, enter:

```
store tcpip from default
config http on
reset
```

NOTE: This will reset all TCP/IP settings to factory default and reset the PrintNet.

10. Power the printer off and then back on.
11. Set the IP address, subnet mask, and default gateway parameters to the desired values.
12. If Web browser access does not work, Telnet into the PrintNet as root. Enter the following command:

```
config http on
```

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

Web Browser/HTTP Problem

In some cases you may not be able to browse the printer web page simply because the PrintNet HTTP may be turned off.

If you can not "**`ping`**" the PrintNet IP address, make sure the IP Address, subnet mask, and default gateway are set correctly by checking the Ethernet Parameters menu from the operator panel. See the *User's Manual* for configuration menu information.

If you can "**`ping`**" the PrintNet IP address but can not access the web pages, perform the following procedure to verify the PrintNet HTTP is turned on.

1. Telnet into the PrintNet and log in as root with no password.
2. At the system prompt enter the following commands:

```
config http on
save
reset
```

3. After approximately 30 seconds, point your browser to the PrintNet IP address. The printer web pages should now be accessible.

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

4 *Unix Configuration*

Overview

This chapter details a complete Unix® setup including:

1. Configuring the PrintNet with its mandatory TCP/IP settings (i.e. IP address and subnet mask).
2. Configuring the Unix host station with a new printer.

Environment Description

The PrintNet supports network printing under various TCP/IP environments including all variations of Unix. Printing can come from multiple hosts directly or through central spooling machines. Figure 18 illustrates this.

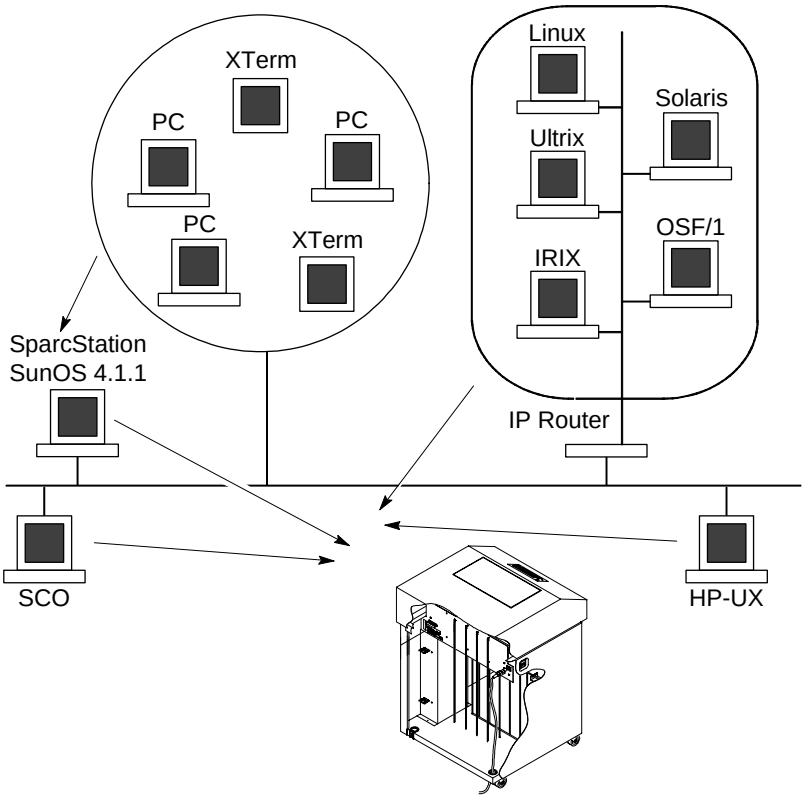

Figure 18. Unix Integration

PrintNet Configuration

There are mandatory settings needed before the print server can be detected on the network. There are also some additional settings that you may want to configure but these are optional. This section offers alternative methods for configuring your PrintNet and mentions some of the more common optional settings available.

Mandatory

Since TCP/IP is used, the PrintNet must be configured, at a minimum, with an IP address and subnet mask before it can be seen on the network.

Optional

Additional settings, like routing entries, can be configured allowing for communication across subnets.

Configuration of the PrintNet can be done from the control panel or through host commands.

Configuration Using the Control Panel

You can set any of three listed parameters from the printer control panel. These parameters are located on the Ethernet Parameters menu. The available parameters are:

- IP Address
- Gateway Address
- Subnet Mask

The procedure for changing any of the parameters is the same. The procedure for changing the IP Address is given here as an example. Use the same procedure for the other required parameters. To change the IP Address parameter, proceed as follows:

1. Make sure the printer is on and raise the printer cover.
2. Press the ON LINE key to place the printer in the OFFLINE mode.
3. Unlock the ENTER key. Refer to the *User's Manual* for instructions.
4. Press the LEFT or RIGHT arrow key until the LCD displays "ETHERNET PARAMS."
5. Press the DOWN arrow key to access the "IP Address" parameter.
6. Press the DOWN arrow key to view the current IP Address.
7. Press the DOWN arrow key to access the portion of the IP Address to be changed.
8. Press the LEFT or RIGHT arrow key to change access to the portion of the IP Address to be changed.
9. Press the DOWN arrow key to select the portion of the IP Address to be changed.
10. Press the LEFT or RIGHT arrow key to select the desired value.
11. Press the ENTER key to make the selection. An asterisk appears to the right of the value.
12. Press the UP arrow key and you will be returned to step 7.
13. When you are finished changing parameters, exit the configuration menus and lock the ENTER key. (Refer to your printer's *User's Manual* for details.)

Using ARP

To configure the Ethernet Interface with its TCP/IP settings using a manual "**arp**" command, the syntax is:

arp -s *ipaddress ethernetaddress*

For the "**aix**" command, the syntax is:

aix -s *ether ipaddress Mac_address*

To use either of these commands:

1. Log on to a Unix station as superuser or root. This station must be located on the same subnet as the PrintNet since ARP is limited to subnets.
2. Find the Ethernet address for the PrintNet by printing a configuration or reading it from the control panel. It must be entered as part of this procedure.
3. Use the "**arp**" command to add an entry into the Unix station ARP table for this PrintNet. Here is the most common syntax for this command:

arp -s *ipaddress ethernetaddress*

Example for Microsoft TCP stacks:

arp -s 192.75.11.9 00:80:72:07:00:60

This example specifies a PrintNet using IP address **192.75.11.9** and Ethernet address **00:80:72:07:00:60**.

4. Verify that the ARP entry was properly applied.

arp -a

You should see an entry in the listed ARP table with the IP address and ethernet address specified in Step 3.

5. Try to "**ping**" this IP address to see if the PrintNet can be seen on your network.

At this point, you should be able to communicate with the PrintNet from your local Unix station. This means the printer knows about an IP address and subnet mask and has these settings in its current memory. However, if the PrintNet is power cycled, these settings will be lost unless you store them in flash memory, as follows:

1. Load a Web browser on your Unix station and direct it to the URL "**`http://`*`PrintNetIPaddress`*`/networkConf.html`**" (e.g. "**`http://192.75.11.9/networkConf.html`**").

NOTE: If prompted for a "User ID" and password first, type in "**`root`**" for the ID and press ENTER at the password prompt since there is no default password.

2. At the "Network Configuration" HTML form that displays, click in the field below the "IP Address" heading and type in the IP address for the PrintNet.
3. Under the "Subnet Mask" heading, enter the PrintNet subnet mask.

NOTE: If you would like to communicate with the PrintNet from across routers, you will need to fill in an entry within the "Routing" section. Please see "Communicating Across Routers" on page 57 for further details.

4. Click on the SUBMIT button when done and physically repower the print server to make sure the new settings are in effect.

Using RARP

RARP allows you to dynamically assign an IP address to the PrintNet upon bootup. To configure the PrintNet with its TCP/IP settings using RARP:

1. On your RARP server, make an entry in the /etc/ethers file for the PrintNet.

Syntax:

ethernetaddress PrintNetIPaddress

Example:

00:80:72:07:00:60 192.75.11.9

2. Start the RARP daemon on the RARP server if not already running. If it is running, send an HUP signal to it with the "**kill**" command:

Syntax:

kill -HUP *pid*

where ***pid*** is the process ID of the RARP daemon.

3. Power on the PrintNet so that it immediately sends out an RARP request. Wait one minute to allow the address assignment process to complete. You should see the STAT LED on the front of the PrintNet slow down indicating it knows about an IP address to use.

4. Try to "**ping**" the PrintNet IP address from a local Unix station to see if it can be seen on your network.

NOTE: You will only be able to communicate with the PrintNet from a network station on the same subnet as the print server. The PrintNet needs to be told about a default router/gateway so any packets that come in from a different subnet can be returned via this gateway. Please see "Communicating Across Routers" on page 57 to set this up.

Using BOOTP

BOOTP allows you to dynamically assign an IP address to the PrintNet upon bootup. In addition, the BOOTP server can provide additional details like a default router/gateway address. To configure the PrintNet with its TCP/IP settings using BOOTP:

1. On your BOOTP server, make an entry in the /etc/bootptab file for the PrintNet.

Syntax:

```
PrintNetIPname:\
:sm=netmask:\
:hd=homedirectory:\
:bf=null:\
:gw=defaultgateway:\
:ht=ethernet:\
:ha=ethernetaddress:\
:ip=ipaddress:\
:ts=timeserver:\
:to=timezone:
```

Example:

```
spike:\
:sm=255.255.255.0:\
:hd=/usr/null:\
:bf=null:\
:gw=192.75.11.1:\
:ht=ethernet:\
:ha=008072070060:\
:ip=192.75.11.9:\
:ts=192.75.11.7:\
:to=25200:
```

2. Turn the PrintNet on so that it immediately sends out a BOOTP request. Wait one minute to allow the IP address assignment process to complete. You should see the STAT LED, in the back of the printer, slow down indicating it knows about an IP address to use.
3. Try to "**ping**" the PrintNet IP address from a network station to see if it can be seen on your network.

NOTE: You will be able to communicate with the PrintNet from network stations on different subnets if the print server has been told about its default router/gateway in the BOOTP response from the BOOTP server.

Communicating Across Routers

Since Unix environments rely on TCP/IP to communicate with the PrintNet, crossing routers becomes an issue.

After following one of the PrintNet configuration methods mentioned (other than the BOOTP method), you will most likely only be able to communicate with the print server from the same subnet. This means any host across a router will not be able to see your PrintNet. In order to communicate across a router, it is best to store a default router/gateway within the print server so that any packets destined for another subnet get forwarded to this router automatically. The router (or series of routers) can then take over ensuring the packets get to their final destination on another subnet on your network.

To configure a default router/gateway within the PrintNet:

1. Load a Web browser on your Unix station and direct it to the URL "**`http://`*`PrintNetIPaddress`*`/networkConf.html`**" (e.g. "**`http://192.75.11.9/networkConf.html`**").

NOTE: If prompted for a "User ID" and password first, type in "**`root`**" for the ID and press ENTER at the password prompt since there is no default password.

2. At the "Network Configuration" HTML form that displays, click in the first field below the "Gateway" heading and type in the IP address of the default router/gateway for the PrintNet subnet.
3. Click on the SUBMIT button when done and physically repower the print server to make sure the new setting is in effect.

Host Configuration

There may be times when you would prefer to or have to perform the manual setup steps for a new printer definition. There may also be times when you require a less common print solution such as direct socket capabilities. This section covers these additional setups.

Manual System V Host Setup

This setup involves any Unix operating system using System V print spooling (e.g. SCO, Solaris®, HP-UX®, DG/UX®, etc.). This means an interface file is used for each defined printer and in the case of any System V print setup involving a PrintNet, the RSHD protocol is used to transfer data from the host to the print server.

To manually configure a new System V printer on a Unix station, create a dummy device file that acts as a locking mechanism between contending print jobs.

Syntax:

`touch /dev/`*`PrintNetname.portname`*

where ***PrintNetname*** is the host or IP name of the print server and ***portname*** is one of its four I/O ports.

Example:

```
touch /dev/spike.prn
```

Manual LPR/LPD Host Setup

The PrintNet also supports Unix operating systems which follow a BSD print system (e.g. SunOS 4.1.x). This means a printcap file is used to define all printers available on the host and interface scripts are not commonly used. Instead, LPR/LPD printers are defined.

To manually configure an LPR/LPD printer on a BSD Unix system:

1. Define an entry for this new printer within the printcap file, /etc/printcap.

Syntax:

```
printername:
:sh:pw#80:mx#0:\
:rm=PrintNetname:\
:rp=PrintNetdestination:\
:lp=:\
:sd=/usr/spool/lpd/printername:\
:lf=/usr/spool/lpd/printername/log:\
:af=/usr/spool/lpd/printername/acct:
```

where ***printername*** is any name you would like to give to this new printer, ***PrintNetname*** is the host or IP name of the print server, and ***PrintNetdestination*** is one of the pre-defined destinations/queues on the device.

Example:

```
P5000:
:sh:pw#80:mx#0:\
:rm=spike:\
:rp=d1prn:\
:lp=:\
:sd=/usr/spool/lpd/ P5000:\
:lf=/usr/spool/lpd/ P5000/log:\
:af=/usr/spool/lpd/ P5000/acct:
```

2. Create the spool directory specified by the “sd=” entry in the printcap entry for this printer.

Example:

```
touch /usr/spool/lpd/ P5000
```

3. Create the log and account files specified by the “lf=” and “af=” entries in the printcap entry for this printer.

Example:

```
touch /usr/spool/lpd/P5000/log
touch /usr/spool/lpd/P5000/acct
```

4. Change permissions and ownership on the spool directory and everything within it.

Example:

```
chmod -R g+rwX,o+rX /usr/spool/lpd/ P5000
chmod -R daemon.daemon /usr/spool/lpd/ P5000
```

5. Start the printer daemon for this new printer.

Example:

```
lpc start P5000
```

You now have a new printer which relies on LPR/LPD to print to a PrintNet printer. Use the following command to test printing:

Syntax:

lpr *-printername filename*

Example:

```
lpr -P5000 /etc/hosts
```

Printing from AIX

Version 4.0 and higher of AIX® offers LPR/LPD support for network printing. This means, to set up a new printer under this operating system, you only need to define these two parameters:

1. **PrintNet IP address.** The IP address or host name of the print server you want to print to.
2. **PrintNet destination/queue.** A pre-defined name on the print server telling the device which I/O port to send the jobs to. You will most likely use "**d1prn**" for the PRN.

Printing with FTP

Print jobs can also be sent to the PrintNet using the File Transfer Protocol (FTP). To do this:

1. On your network station, change to the directory containing the file you want to print.
2. Open an FTP session with the PrintNet.

Syntax:

ftp *PrintNetIPaddress*

3. Log in as "**root**".
4. At the password prompt, press ENTER since there is no default password.
5. Change to the **dest** directory.

Syntax:

cd dest

6. List the contents of this directory using the "**dir**" command and determine which destination/queue you would like to send the print job through. Most likely you will select "**d1prn**" for the PRN port.
7. Change to this destination directory.

Example:

cd d1prn

8. Change the mode to correspond with the type of file you are going to print. By default, ASCII is set for text-only files but if you need to print both text and graphics, select binary using the "**bin**" command.
9. Place the file to be printed within this directory on the PrintNet so it can be spooled and printed.

Syntax:

put *filename*

10. Close the FTP session, unless you have more jobs to print.

Syntax:

quit

Direct Socket Printing

Within TCP/IP environments, there are some setups which require the host to print directly to a TCP port number on the PrintNet, bypassing all of the higher level destination/queue names. If you run into a setup which requires this, you will need to define two parameters for a new print setup:

1. **PrintNet IP address.** The IP address or host name of the print server you want to print to.
2. **PrintNet TCP port number.** A pre-defined number for the I/O port on the print server. 9100 is the default port number.

Though the host will be sending directly to a TCP port number on the PrintNet, the port numbers are still mapped to destinations/queues in case there is some type of special processing or logging to be done to the job. However, the destination name is of no concern in this type of printer definition. Only the two parameters mentioned above need to be defined for printing to work.

Troubleshooting Tips

This section provides information on possible solutions to some standard configuration errors. If you require technical support, please have as much of the following information available when you call:

1. What level of software are you running?
2. What type of attachment do you have?
3. What is your host operating system?
4. Give a detailed description of the problem.
5. How often, and when, does the problem occur?
6. Give a detailed description of your network and the components attached.

Please follow these tips to determine what the problem may be with your PrintNet configuration.

PrintNet Will Not Talk on the Network

- Have you configured the PrintNet with a unique and valid IP address which corresponds with the other IP addresses on your network? For example, are you sure no other device is using this IP address?
- Are you sure you are trying to talk to the PrintNet from a Unix station on the same subnet? Currently, the print server can only be seen locally unless you configured it with a routing entry.
- If you look at the back of the printer, is the STAT LED flashing once a second or is it quicker than that? A slower, once-a-second rate tells you that the print server is in fact configured with an IP address. A

faster rate says it knows nothing about this so you may need to try the configuration process again.

- Have you confirmed that the network connection to the PrintNet is working correctly? Trying different network cables and locations will help narrow down the problem.

Nothing Prints

- Can you "**`ping`**" the PrintNet from your Unix station? If not, please refer to "PrintNet Will Not Talk on the Network," above.
- Is the PrintNet able to communicate with the attached printer? To test this, you can:

1. "**`telnet`**" to the print server (e.g. "**`telnet 192.75.11.9`**") and log in as "**`root`**".
2. Enter the command "**`start fox`** ***`portname`*** " where portname is either "**`prn`**".
3. Execute "**`stop`** ***`portname`*** " right after starting the test.

This test will send the same text line over and over to the attached printer.

- Is the job getting stuck in the Unix host queue? If so, check that the printer is online. If it is, there is a configuration error on the Unix station so creating a new print setup may be needed.
- Is the control panel showing any activity to indicate it is receiving data? If so, but there is nothing printing, check to see if a manual formfeed is needed. Also, ensure that the printer can support the type of job coming through.
- Do all jobs fail or just certain ones? For example, is it possible that jobs from a certain application are the only ones to fail. If so, check the type of data it sends to make sure it matches the printer emulation. Check the application printer configuration for mistakes.

Stair-Stepped Output

Stair-stepped output is print which starts at the top left of the page but every line thereafter starts a little further over to the right. It also refers to Unix jobs that print one line of text at the top of a page followed by a series of blank pages.

This kind of output happens only with Unix text jobs if carriage return insertion is not incorporated into the print setup. The printer may be told to do a linefeed but the Unix job does not specify anything about a carriage return to follow this.

To fix this, carriage return insertion must be enabled somewhere in the print setup. The easiest and most common location is on the PrintNet itself within the appropriate model. The feature is called “onlcr” and the command syntax is:

`set model` ***`modelname`*** **`stty onlcr`**

`save`

For example, if printing to the destination, **d1prn**, the associated model is **m1**. Therefore, the command is:

```
set model m1 stty onlcr
save
```

No Form Feed or Extra Page Comes Out

Unix text jobs may also have problems outputting the last page of a job especially when the BSD Remote (LPD) print method is used. This means the form feed button has to be pressed on the printer to get this last page out.

To make this process automatic, tell the PrintNet to handle this task by setting this feature “on” in the appropriate model. The command syntax is:

`set model` ***`modelname`*** **`trailer $FF`**

`save`

For example, if printing to the destination, **d2prn**, the associated model is **m2**. Therefore, the command is:

```
set model m2 trailer $FF
save
```

For default destination model mappings of the PrintNet, please see “PrintNet Naming Schemes” on page 128.

TCP/IP Access Problem

If you can “**ping**” the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the PrintNet, there may be an incorrect entry in the TCP access list. In order for this workstation to use the PrintNet in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.
2. All entries must be deleted from the TCP list to grant all workstations/ hosts access to the above TCP services.

To view the current access list:

Use the printer control panel to access the configuration menu (see the *User’s Manual* for configuration menu information). From the DIAGNOSTICS/Printer Tests menu choose the E-net Test Page. When the page prints, look under the “TCP ACCESS TABLE” section for the TCP access list entries.

To add/delete a TCP access list entry, refer to “TCP Access Lists” on page 121.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the control panel. See the *User’s Manual* for configuration menu information.
2. Power off the printer.

3. On the PrintNet, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the PrintNet, place SWITCH 2, the center switch, in the up position.
6. From a workstation attached to this network segment, create an ARP entry. The PrintNet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```

7. Try to "**ping**" this IP address to see if the PrintNet can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.
8. Telnet into the PrintNet using the same IP address as above. Log in as root with no password.
9. At the system prompt, enter:

```
store tcpip from default
config http on
reset
```

NOTE: This will reset all TCP/IP settings to factory default and reset the PrintNet.

10. Power the printer off and then back on.
11. Set the IP address, subnet mask, and default gateway parameters to the desired values.
12. If Web browser access does not work, Telnet into the PrintNet as root. Enter the following command:

```
config http on
```

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

5 *Novell Configuration*

Overview

This chapter details a complete Novell setup including:

1. Identifying the PrintNet on the network.
2. Configuring the PrintNet with its mandatory print setup settings.
3. Configuring a new print queue on the file server.

Environment Description

The PrintNet supports network printing under Novell environments by using IPX. It supports all 3.1X versions of NetWare. Figure 19 provides a Novell setup overview. Version 4.1X is supported under bindery emulation only.

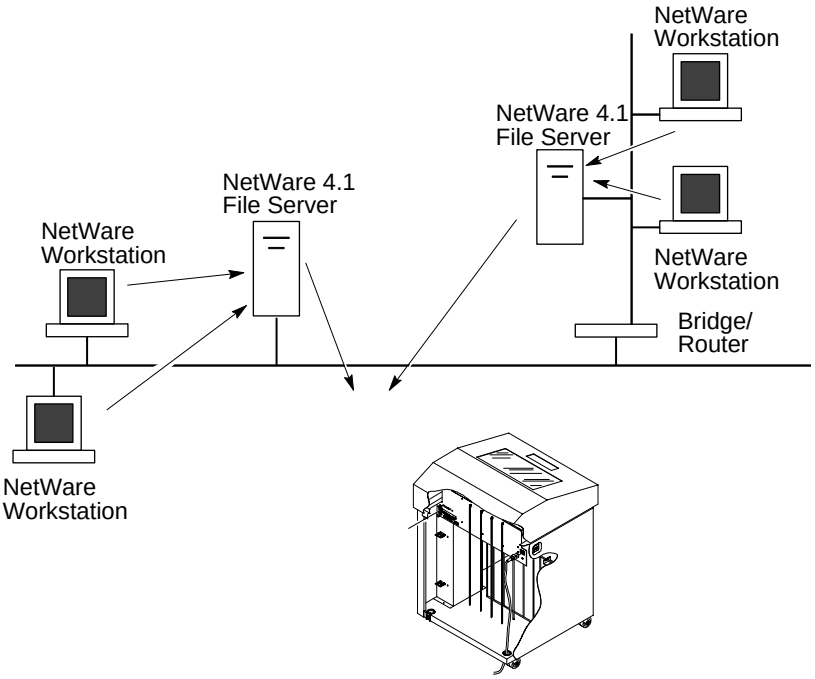

Figure 19. Novell Integration

PrintNet Configuration

Under all Novell environments, the PrintNet does not require any network settings to make it visible on the network. Simply plug it in to your network and power it on. However, with a new print queue setup on a Novell file server, there can be some mandatory settings needed on the PrintNet.

Using HTML Forms

When defining a new print queue on a Novell file server, a new print server must be defined to represent the PrintNet. This name must match the pre-defined name given to the print server. By default, this name is in the format "M_*xxxxxx*" where "*xxxxxx*" equals the last six digits of the PrintNet Ethernet address found on a configuration printout or control panel settings under Ethernet parameters, MAC Address (e.g. M_071C1A).

To use the HTML forms to define a print queue, do the following:

1. Load a Web browser on a network station that can communicate with the print server over TCP/IP. The command to change the print server name is:

Syntax:

`store pserver name` ***`newname`***

Example to change the name to **`micro1`**:

`store pserver name micro1`

2. Direct your Web browser to URL "**`http://`*`PrintNetIPaddress`*`/adminConf.html`**" (e.g. "**`http://192.75.11.9/adminConf.html`**").

NOTE: If prompted for a "User ID" and password first, type in "**`root`**" for the ID and press ENTER at the password prompt since there is no password by default.

3. At the "Administration Configuration" HTML form that displays, highlight the field beside the "Name" heading and type in the new name of the print server.

4. Click on the SUBMIT button when done and physically repower the printer to make the new setting take effect.

Host Configuration

Under all versions of NetWare®, both PSERVER and RPRINTER setups are supported by the PrintNet. Since a PSERVER setup is the most common, you will find the necessary steps to configure the PrintNet as a PSERVER shown first. Configuration for RPRINTER and NPRINTER setup follow the PSERVER information.

NOTE: The PrintNet can service up to four printers on one file server. It can not service multiple file servers at one time.

NetWare Version 3.x PSERVER Setup

To configure a print queue on a NetWare 3.1x network:

1. Log on to the Novell file server as supervisor.
2. Enter PCONSOLE.
3. Select “Print Queue Information” from the PCONSOLE Main Menu.
4. Press INSERT to add a new queue to the list of currently defined queues showing.
5. Type in the name of this new queue when prompted and press ENTER. This can be any name you would like.
6. Press ESCAPE to return to the Main Menu.
7. Select “Print Server Information” and press ENTER.
8. Press INSERT when the list of existing print servers displays.
9. Type the name of the PrintNet when prompted for a print server name and press ENTER when done. By default, the PrintNet is named “M_*xxxxxx*” where “*xxxxxx*” equals the last six digits of the print server Ethernet address found on configuration printouts or reading MAC address on control panel. (e.g. M_071C1A).
10. Back at the print server list, select this newly defined PrintNet and press ENTER.
11. Select “Print Server Configuration” from the menu that displays.
12. Select “Printer Configuration” from the next menu to display a list of configured printers.

13. Select the first item listed as “NOT INSTALLED” and press ENTER.
14. At the printer configuration window, type in the name for this new printer. This name must be one of the pre-defined destinations/ queues on the PrintNet. This will normally be “**`d1prn`**”.
15. Go to the “Type” field and press ENTER to see the possible choices.
16. Select “Defined Elsewhere” from this list.
17. When done, press ESCAPE and select “Yes” to save the changes to this new printer.
18. Press ESCAPE again to return to the “Print Server Configuration” menu.
19. Select “Queues Serviced by Printer.”
20. Select this new printer from the printer list that displays and press ENTER.
21. At the empty queue list that displays, press INSERT.
22. Select the queue created in step 5 and press ENTER.
23. When prompted for the priority, press ENTER to select the default or select a priority.
24. Press ESCAPE until back at the PCONSOLE Main Menu.
25. Repower the printer.
26. Wait two minutes and then select “Print Queue Information” from the PCONSOLE Main Menu.
27. Select this new queue from the menu that displays. Select “Currently Attached Servers” to see which print server is servicing this queue.

At this point, the PrintNet name (e.g. M_071C1A) should show within this window. This means the PrintNet knows about this new Novell print queue it must service as a PSERVER. Therefore, it will poll this queue regularly looking for jobs to print.

NOTE: The PrintNet can service up to four printers on one file server. It can not service multiple file servers at one time.

NetWare Version 3.x RPRINTER Setup

These steps are for Novell environments with Netware 3.x (or earlier) file servers.

To configure a new RPRINTER on a NetWare 3.x network:

1. Log in to the PrintNet command shell, npsh, as root.

   If you have TCP/IP available and this print server already has an IP address stored within it, you can use the built-in HTML configuration forms or a Telnet session. Please see the “Configuration Tools” in Chapter 1 for further details. If you have only Novell available, you will need to use a PC, laptop, or terminal.

NOTE: If you use HTML configuration, you will need to go to the “Network Configuration” HTML form (i.e. “**`http://`*`PrintNetIPaddress`*`/networkConf.html`**”; e.g. “**`http://192.75.11.9/networkConf.html`**”) and look under the “Novell” section. The settings in the following step are found there. If using a Telnet session, you will need to manually execute the commands listed in the next step.

2. Store the RPRINTER settings on the PrintNet. This will refer to an existing PSERVER.NLM on the file server or to one that you will create later in these steps.

Syntax:

`store rprinter add `*`PSERVERname printernumber PrintNetdestination`*

Example for an RPRINTER servicing printer **`0`** of the PSERVER.NLM called **`pserver1`** and sending jobs to the PrintNet destination **`d1prn`**:

```
store rprinter add pserver1 0 d1prn
```

3. Leave this PrintNet login session and log on to the NetWare 3.x file server as Supervisor.
4. Load a PSERVER.NLM if there is not one loaded already. This will be the PSERVER that the PrintNet services as an RPRINTER so it must match the PSERVER name given in step 2.
5. Enter PCONSOLE.
6. Select “Print Queue Information” from the PCONSOLE Main Menu.

7. Press INSERT to add a new queue to the list of currently defined queues.
8. Type in the name of this new queue when prompted and press ENTER. This can be any name you would like.
9. Press ESCAPE to return to the Main Menu.
10. Select “Print Server Information” and press ENTER.
11. Press INSERT when the list of existing print servers displays.
12. Select the print server that you want the PrintNet to service as an RPRINTER. This is the PSERVER.NLM loaded in step 4.
13. Select “Print Server Configuration” from the menu that displays.
14. Select “Printer Configuration” from the next menu to display a list of configured printers.
15. Select an item from the list (i.e. either an existing printer name or a “Not Installed” one) to display the printer configuration window.
16. Assign a name (if not an existing printer) to this printer.
17. At the “Type” field, select “Remote Other/Unknown.”
18. Press ESCAPE to save the changes.
19. Press ESCAPE until back at the “Print Server Configuration” menu.
20. Select “Queues Serviced by Printer” to display a list of defined printers.
21. Select the printer you just defined and press ENTER.
22. At the list of queues that displays, press INSERT to add a queue to the list.
23. Select the queue defined and press ENTER.
24. When prompted for a priority, press ENTER to select the default or select a priority.
25. Press ESCAPE until you have exited PCONSOLE.
26. Reload the PSERVER.NLM that the PrintNet is to service as an RPRINTER.
27. Repower the PrintNet by turning the printer off and then back on.

28. Wait two minutes and then check your PSERVER to see if the appropriate printer is being serviced. The PSERVER should indicate that the printer is “Waiting for job.”

At this point, the PrintNet knows to receive any jobs this PSERVER.NLM has to send to it through the defined printer.

NetWare Version 4.x PSERVER Setup

PrintNet destinations are case sensitive and will not be recognized if they are typed incorrectly. By default, they are all lower case. If you are setting up a NetWare 4 environment, the destination must be renamed to uppercase to match the PCONSOLE entry.

The PrintNet can be used in a NetWare 4 environment with either of the following options:

- Set the PrintNet up as a PSERVER, replacing a dedicated printer.
- Set the PrintNet up as an RPRINTER, interacting with an existing PSERVER (see page page 77).

NOTE: Following a PSERVER setup, bindery emulation is required.

To configure the PrintNet as a PSERVER in a NetWare 4 environment:

1. Log in to the Novell as supervisor.
2. Enter PCONSOLE.
3. Press F4.
4. Select PRINT QUEUES.
5. Press INSERT to add a queue.
6. Type in new queue name and press ENTER.
7. Press ESCAPE.
8. Select PRINT SERVERS.
9. Press INSERT to add the new print server.
10. Type the name of the PrintNet. By default, it is M_*xxxxxx* where *xxxxxx* equals the last six digits of the Ethernet address. (e.g. M_000BF5)
11. Select this new print server and press ENTER.

12. Select PRINTERS.
13. Press INSERT to add a printer to the list.
14. Type in the name of one of the default destinations on the unit for the NAME field and go to the type field.
15. Press ENTER at this field and select DEFINED ELSEWHERE. If DEFINED ELSEWHERE is not available, choose PARALLEL.
16. Press ENTER on the Print Queues Assigned field.
17. Press INSERT to display all queues; select the one you defined in step 5 and press ENTER.
18. Select a priority and press ENTER. Priority 1 should be sufficient.
19. Press ESCAPE until you are back to Main Menu.
20. Reboot the Print Server by repowering the printer.
21. Check the CURRENTLY ATTACHED SERVERS and verify the print server is active.
22. Press ESCAPE until you are out of the PCONSOLE.

Even though the entire print set up is done through PCONSOLE, you may want to communicate directly with the print server in order to modify settings, monitor the unit, etc. To communicate with the print server, the optional host software, **`npsh.exe`**, is included. **`npsh.exe`** is a DOS executable program that can be run from a DOS prompt on a NetWare workstation.

npsh.exe performs the following:

`npsh nvplist`
Lists all of the PrintNet devices on the network; each name is in the default format M_*xxxxxx* (where *xxxxxx* equals the last six digits of the unit Ethernet address). This is regardless of whether it is configured as a PSERVER or an RPRINTER.

`npsh` ***`unitname`***
Starts a Telnet-like session with the named print server, allowing you to configure, monitor, and troubleshoot the unit with the built-in command set.

npsh *unitname command*

Initiates a single Command with guest access only to the unit instead of entering into a complete session.

To communicate with the unit using **npsh.exe**:

1. From a DOS prompt on a Novell workstation, begin a npsh session with the unit.

npsh *unitname*

Starts a Telnet-like session with the named print server with guest access only.

2. To obtain root access to the unit, type:

supervisor

A standard login screen is displayed prompting you for the login name and password.

3. Login to the unit as root user.

root

NOTE: Root users require the use of a password as configured in the unit user list.

4. Enter the password. If this password is not yet set, press enter at the password prompt. Otherwise, enter the password that is already stored in the unit.

password

You are now logged in to the unit as a root user and can access any npsh command on the unit.

NOTE: Because **npsh.exe** makes use of broadcasts, you may have problems communicating across a router.

NetWare Version 4.x RPRINTER Setup

PrintNet can be configured to service both RPRINTER, NDS mode, and PSERVER, bindery mode.

Use the following procedure to set up an RPRINTER form of attachment on a 4.x server:

1. PrintNet requires a bindery server login on the 4.1x as the first step to servicing RPRINTER. This bindery login is necessary for registering the PrintNet Pserver name; no bindery queues or printers are setup. Using Pconsole, bindery mode, create a bindery printer server object whose name matches that of the PrintNet at the root context of the 4.1x box (i.e., M_03092B). After creating the bindery PrintServer on the 4.1x server, reboot PrintNet and use the **`debug Novell pserver`** command via a Telnet or npsh session, or print the E-net Test Page out to make sure there is a successful server login.
2. Using either PCONSOLE in NDS mode, or NWADMIN:
    a. create an NDS queue (any name you want), or simply use an existing one;
    b. create a print server to use (any valid name, or choose one already in existence);
    c. create a printer object to use with the print server object you chose or created, and attach it to the chosen queue;

NOTE: The 4.1x queue name, print server name, and printer object don't have to match any PrintNet name; multiple printers can be defined, but only one print server can be attached to.

Example:

NDS queue name:	Finance
NDS print server name:	Fin_Q
NDS printer name:	Fin_Prt_1
NDS printer name:	Accounting_Prt_1

3. At a 4.1x console session, if a pserver.nlm session is already running for Fin_Q, first unload it, then reload it to find the new objects, or, simply issue **`load pserver Fin_Q`**.
   If you are successful the print server console screen will show a 'printer status' option. In the 'printer status' window, note the numbers assigned to the printers you created. Assume for our example that one printer previously existed (number 0), and we are adding two more, whose numbers became 1, and 2.

NOTE: On the load command you must strictly follow case of the name (this is not required on PrintNet).

4. Via a Telnet or npsh session create RPRINTER attachments:

`store rprinter add Fin_Q 1 d1prn`

This command assigns destination d1prn as the RPRINTER 1 service path.

`store rprinter add fin_q 2 d4prn`

This command assigns destination d4prn as the RPRINTER 2 service path.

For PrintNet entries, case does not have to be observed. Also, if you want to change the destination names from d*x*prn, do so first with the **`set dest <dest> name <new name>`** command, being sure to use the save command so these reappear after a reboot.

5. Reboot the PrintNet adapter (power the printer off and on, or use the **`reset`** command) so the new RPRINTER service names are broadcast.
6. Open a Telnet or npsh session and log into PrintNet. Wait a minute or two, then use the **`list rprinter`** command, and you should see your entries. You could also do this by looking at the connection status on the 4.1x PSERVER printer status entries.
7. If you add, delete or change RPRINTER entries on PrintNet or 4.1x console, you should always unload and reload the pserver.nlm module to register the changes. The PrintNet can be configured and ready before the pserver.nlm is reloaded, or PrintNet can be reset after pserver.nlm is reloaded.
8. A web browser can also be used to see the RPRINTER attachments, etc. and status.

Troubleshooting Tips

This section provides information on possible solutions to some standard configuration errors. If you require technical support, please have as much of the following information available when you call:

1. What level of software are you running?
2. What type of attachment do you have?
3. What is your host operating system?
4. Give a detailed description of the problem.
5. How often, and when, does the problem occur?
6. Give a detailed description of your network and the components attached.

Please follow these tips to determine what the problem may be with your PrintNet configuration.

NetWare 3.x - No PSERVER Connection

- Has the PrintNet been power cycled once the PCONSOLE steps were completed? This will make the print server boot up and realize which print queue and file server it needs to service.
- Is the PrintNet already servicing a queue on another file server? If so, it can not service another file server at the same time.
- When defining a new "**`print server`**" within PCONSOLE, did you use the correct name for the PrintNet (e.g. M_071C1A)? By default, it only recognizes itself as "M_*xxxxxx*" where "*xxxxxx*" equals the last six digits of its Ethernet address found on the configuration printout.
- When defining a new "**`printer name`**" within PCONSOLE, did you use a pre-defined destination/queue rather than a name of your own? By default, the PrintNet only recognizes names like "**`d1prn`**." All other names will be ignored by the device.
- Is the PrintNet in **`Bindery`** mode as seen under the "**`list pserver`**" output on the device? If servicing only a NetWare 3.x file server, it must be set to handle Bindery services. The default setting is Bindery.

- Is there an available NetWare user license for the PrintNet to use while it acts as a PSERVER? Every PSERVER takes up one user license since it logs in to the Novell file server.
- Have you given the connection process some time after repowering the PrintNet? In larger Novell environments, the file server identification and connection process can take several minutes.

NetWare 4.x - No PSERVER Connection

- Has the PrintNet been power cycled once the PCONSOLE steps were completed? This will make the print server boot up and realize which print queue and file server it needs to service.
- Is the PrintNet already servicing a queue on another file server? If so, it can not service another file server at the same time.
- When defining a new "**`print server`**" within PCONSOLE, did you use the correct name for the PrintNet (e.g. M_071C1A)? By default, it only recognizes itself as "M_*xxxxxx*" where "*xxxxxx*" equals the last six digits of its Ethernet address found on the configuration printout.
- When defining a new "**`printer name`**" within PCONSOLE, did you use a pre-defined destination/queue rather than a name of your own? By default, the PrintNet only recognizes names like "**`d1prn`**." All other names will be ignored by the device.
- Is the PrintNet in **`Bindery`** mode as seen under the "**`list pserver`**" output on the device? If servicing only a NetWare 4.x file server, it must be set to handle Bindery services. The default setting is Bindery.
- Is there an available NetWare user license for the PrintNet to use while it acts as a PSERVER? Every PSERVER takes up one user license since it logs in to the Novell file server.
- Have you given the connection process some time after repowering the PrintNet? In larger Novell environments, the file server identification and connection process can take several minutes.

6 *OS/2 Configuration*

Overview

This chapter details a complete OS/2 configuration setup including:

1. Configuring the PrintNet Interface with its TCP/IP settings
2. Configuring a new printer on an OS/2 workstation. The procedure given will be from an OS/2 Warp 4 system, but the setup is similar to OS/2 Warp 3 and v2.11.
3. OS/2 must have TCP/IP installed on it and be configured with the correct IP parameters. See OS/2 documentation/help and your network administrator.

Configuring the PrintNet Interface TCP/IP Settings

There are mandatory TCP/IP settings (i.e. an IP address and subnet mask) needed before the print server can be detected on the network. There are also some additional settings that you may want to configure but these are optional. This section offers alternative methods for configuring your PrintNet Interface within an OS/2 environment and mentions some of the more common optional settings available.

Mandatory Settings

The PrintNet Interface must be configured with an IP address and subnet mask at a minimum. Consult you network administrator to obtain the proper values for these parameters.

Optional Settings

One additional setting, the gateway address, is necessary if the OS/2 workstations must communicate with the PrintNet Interface across a router. Consult your network administrator to obtain the proper value for this parameter.

Configuration using the Printer Operator Panel

You can set any of three listed parameters from the control panel. These parameters are located in the Ethernet Parameters menu. The available parameters are:

- IP Address
- Gateway Address
- Subnet Mask

The procedure for changing any of the parameters is the same. The procedure for changing the IP Address is given here as an example. Use the same procedure for the other required parameters. To change the IP Address parameter:

1. Make sure the printer is on and raise the printer cover.
2. Press the ON LINE key to place the printer in the OFFLINE mode.
3. Unlock the ENTER key. Refer to your printer's *User's Manual* for instructions.
4. Press the LEFT or RIGHT arrow key until the LCD displays "ETHERNET PARAMS."
5. Press the DOWN arrow key to access the "IP Address" parameter.
6. Press the DOWN arrow key to view the current IP Address.

7. Press the DOWN arrow key to access the portion of the IP Address to be changed.
8. Press the LEFT or RIGHT arrow key to change access to the portion of the IP Address to be changed.
9. Press the DOWN arrow key to select the portion of the IP Address to be changed.
10. Press the LEFT or RIGHT arrow key to select the desired value.
11. Press the ENTER key to make the selection. An asterisk appears to the right of the value.
12. Press the UP arrow key and you will be returned to step 8.
13. When you are finished changing parameters, exit the configuration menus and lock the ENTER key. (Refer to your printer's user's manual for details.)

Test the setting by performing a **ping** command from an OS/2 command prompt as follows:

ping *ip_address*

where the ***ip_address*** is the IP address of the printer PrintNet Interface. If this does not work, repeat the steps to make sure the IP values on the operator panel are correct. If they are correct, contact your network administrator for possible network problems.

OS/2 Workstation Configuration

OS/2 must use the TCP/IP LPR protocol in order to send jobs to the PrintNet to be printed. This section will explain how to use the LPR command and how to setup an OS/2 print queue which will forward jobs to the printer using the LPR protocol.

Using the LPR Command

At an OS/2 command prompt, enter **lpr -s *ip_address* -p *EthernetInterface_queue filename***

NOTE: This name must be the name of an existing destination/queue on the PrintNet and it must be lowercase by default. You will most likely use **d1prn**.

Troubleshooting

Check the IP information on both the PrintNet and the OS/2 station for correctness. Make sure the *PrintNet_queue* is actually defined on the Ethernet Interface and that you are spelling it correctly.

Using an OS/2 LPR Print Queue

This section describes how to setup an OS/2 Warp 4 print queue to print to the PrintNet using the LPR protocol. TCP/IP for OS/2 must be installed on your OS/2 workstation. This procedure is similar to for OS/2 Warp 3 and v2.11.

To setup the printer queue:

1. Find the Printer template icon. It may be in the Printers folder or the Templates folder.
2. Right click on the icon then select “Install.” The “Create a printer” dialog box is displayed.
3. Enter any desired name for the printer. This will be the name of the printer queue.
4. In the “Default printer driver” list, select the desired driver. If the desired driver does not appear in the list, click on “Install new printer driver...” and follow the instructions to install the desired driver.
5. In the “Output port” list, double click on an unshaded \PIPE\LPDx port. If all are shaded, you will have to double click on a shaded port and change the parameters. If no \PIPE\LPDx ports are shown, follow these steps to install them:
   a. Right click on a port and select “Install.”
   b. Select the “New port drivers” radio button.
   c. In the “Directory” field, type **`d:\TCPIP\DLL`** where d: is the drive where the TCPIP subdirectory exists.

d. Click on “Refresh.” Several \PIPE\LPDx port icons should appear in the “Output port” list. If none appear, type **`d:\MPTN\DLL`** in step c. and try this step again.

NOTE: If no ports appear after completing step d., search your drives for the LPRPDRVR.PDR and type the path to this file, not including the file name, in step c. The final step available is to ask OS/2 support to install these ports.

e. Select all the ports with the mouse pointer and click on “Install.” The \PIPE\LPDx ports should now show in the “Output port” list.

6. The “\PIPE\LPDx - Setting” dialog box is displayed.
7. In the “LPD server” field, type the IP address of the PrintNet.
8. In the “LPD printer” field, type the name of the defined destination / queue on the PrintNet.

NOTE: This name must be the name of an existing destination/queue on the PrintNet and it must be lowercase by default. You will most likely use **`d1prn`**.

9. Optionally, click on “Help” to understand the other parameters and enter those values.
10. Click “OK.”
11. Click on “Create.” The print queue is created and placed in the Printers folder or possibly on the OS/2 desktop.
12. Make sure LPRPORTD is running. Type **`Ctrl-Esc`** and check the list for a line that contains LPRPORTD. If it is running, this process is complete. If it is not running, enter the following at the OS/2 command prompt:

```
start lprportd
```

You will probably want to put this command in your “STARTUP.CMD” file, or use the TCP/IP Configuration tool to set it to autostart on boot up.

Any jobs sent to this queue will now be forwarded to the PrintNet to be printed.

Starting the LPR Port Daemon

The LPR Port Daemon must be started to enable TCP/IP printing. To start the LPR Port Daemon;

1. Open the TCP/IP folder, which is in the OS/2 System folder for Warp 3.0.
2. Open TCP/IP Configuration.
3. Select the “Autostart” tab on the notebook.
4. In “Services to Autostart,” select “lprportd.”
5. Select “Foreground Session” and “Minimized.”
6. Close the notebook by double clicking the system icon, which is located in the upper left corner.
7. Select “Save.”
8. If prompted, respond **`Yes`** to save the configuration changes.
9. At the OS/2 command prompt, enter **`tcpstart`** to restart TCP.

Troubleshooting

Check the IP information on both the PrintNet and OS/2 station for correctness.

Make sure the value in step 8 is actually defined on the PrintNet. See “Configuration Tools” on page 16 to determine how to verify this. Verify also that you are spelling the printer name correctly.

Verify that LPRPORTD is running.

TCP/IP Access Problem

If you can “**`ping`**” the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the PrintNet, there may be an incorrect entry in the TCP access list. In order for this workstation to use the PrintNet in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.

2. All entries must be deleted from the TCP list to grant all workstations/ hosts access to the above TCP services.

To view the current access list:

Use the printer control panel to access the configuration menu (see the *User's Manual* for configuration menu information). From the DIAGNOSTICS/Printer Tests menu choose the E-net Test Page. When the page prints, look under the "TCP ACCESS TABLE" section for the TCP access list entries.

To add/delete a TCP access list entry, refer to "TCP Access Lists" on page 121.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the control panel. See the *User's Manual* for configuration menu information.
2. Power off the printer.
3. On the PrintNet, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the PrintNet, place SWITCH 2, the center switch, in the up position.
6. From a workstation attached to this network segment, create an ARP entry. The PrintNet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```

7. Try to "**ping**" this IP address to see if the PrintNet can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.

8. Telnet into the PrintNet using the same IP address as above. Log in as root with no password.
9. At the system prompt, enter:

```
store tcpip from default
config http on
reset
```

NOTE: This will reset all TCP/IP settings to factory default and reset the PrintNet.

10. Power the printer off and then back on.
11. Set the IP address, subnet mask, and default gateway parameters to the desired values.
12. If Web browser access does not work, Telnet into the PrintNet as root. Enter the following command:

```
config http on
```

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

7 AS/400 Configuration

Overview

There are several methods of printing with PrintNet to a print server attached printer via an AS/400; each method should be chosen on the basis of your print needs.

The easiest methods for single files or print specific files which require manually entered data are LPR, and FTP.

For spooled (automatic) or batch printing, a Remote Output Queue should be created.

Start by considering the nature of the data you wish to print. ASCII, for example, dictates the need to establish the printer emulation to set on the printer, and the choice of SCS to ASCII conversion.

References

To help you, IBM provides a number of references to help configure TCP/IP printing. Some of these are:

- IBM Redbook, “IBM AS/400 Printing IV” GG24-4389
- IBM Redbook, “IBM AS/400 Printing III” GG24-4028
- “Operating System/400 Workstation Customization Function Programmer’s Guide”, SC41-0056

It is highly encouraged that you obtain one or more of these references, as they cover all needed details about the AS/400.

AS/400 Configuration

The process of using Ethernet printing via the PrintNet interface on an AS/400 involves the same procedure as setting up any other print server.

Procedure

1. Obtain an IP address and subnet mask to use for the PrintNet adapter. Usually the default subnet mask of 255.255.255.0 is satisfactory (for a class C network).
2. Decide on what you want the name of the print destination to be. The defaults for the PrintNet are d1prn, d2prn, d3prn, or d4prn. Once you have an IP address, subnet mask, and if required, a gateway address, assigned and entered into the PrintNet, you may use either a TELNET session (or a Web browser if you have one) to change one or more of these print destination names to something meaningful to you. For example, you may want to leave the destination as the default, and after you have your first queue set up successfully, then create a custom-named server destination.
3. Enter the IP address in the HOSTS table along with any device name you wish. For example, **`192.192.192.100 main_prt`** might be such an entry. The name is for your reference, but you can also choose this name based on location, function, what you want the print destination to be and so on.
4. Using the printer's front panel (or via the IPAssign software, or static ARP assignment if you prefer) set the PrintNet adapter to match the values in step 3.

NOTE: If you do not have a gateway, but accidentally enter one in the PrintNet, you will not be able to establish a connection. In this case, set the gateway value to 255.255.255.255 or 0.0.0.0, both of which disable dependence on a gateway. The easiest way to set these values is to use the printer front panel. Test the connection by "ping"-ing the IP address you chose. This establishes a live connection. Or, you may use the E-Net test page print out from the DIAGNOSTICS/Printer Tests menu (see the *User's Manual* for instructions) if a gateway is used. The E-net test concludes with a ping and report of the gateway.

5. If in you choose a destination name other than the default of d*x*prn, establish a TELNET session (or use a Web browser) and modify the PrintNet destination name. This can be done via a “green screen” TELNET session, a tn5250 session from OS/2, a TELNET session from Windows, etc.
6. The end data stream required for the PrintNet is ASCII. This is accomplished either by sending ASCII files (usually AS/400 files are not ASCII, but ASCII files can be placed as Documents in Folders by FTP or Client Access, etc.), or by converting SCS to ASCII via a transform process (WSCST filter to map SCS to ASCII). The printer emulation should be set to P-Series, Serial Matrix, Epson FX, or Proprinter. If you wish to use Office/400 to create Documents for printing, set the printer emulation to Epson FX or Proprinter. Often what is desired is to utilize the output of RPG, COBOL programs by convert the resulting SCS output to ASCII via the WSCST filter table.

Example

The example outlined below will follow this procedure:

- RPG is used to create PGL or VGL output (output might previously be directed to a printer with a twinax interface).
- Printer is set to IGP.
- d1prn is the print destination.
- A simple line printer WSCST Object is created to just send line feeds, carriage returns, and form feeds. No character tables are needed. Since no “generic line printer” exists as a MFTYPMDL, we will create one.
- An Output Queue named IP_P5000 is created.

1. Use RTVWSCST command to retrieve a table as a model to modify. See the print screens below.

```
Retrieve WSCST source (RTVWSCST)

Type choices, press Enter.

 Device type . . . . . > *TRANSFORM *TRANSFORM, 3101, 3151...

 Manufacturer type and model . . . . . .

 Source member  . . . . . Name

 Source file . . . . . QTXTSRC Name

 Library . . . . . *LIBL Name, *CURLIB, *LIBL

 Text 'description' . . . . . *BLANK
```

2. Highlight “Manufacturer type and model”, and press F4.

```
Specify Value for Parameter MFRTYPMDL

Type choices, press Enter.

Type . . . . . :CHARACTER
Manufacturer type and model . .

*IBM2380              *IBM4029HP
*IBM2381              *IBM4037
*IBM2390              *IBM4039HP
*IBM2391              *IBM4070
*IBM3812              *IBM4070EP
*IBM3816              *IBM4072
*IBM3912HP            *IBM4076
*IBM3916HP            *IBM42011
*IBM39302             *IBM42012
*IBM39303             *IBM42013
*IBM4019              *IBM42021
*IBM4019HP            *IBM42022
*IBM4029              *IBM42023              +
```

Example

3. Pick the IBM 6404 as a starting point.

```
Retrieve WSCST source (RTVWSCST)

Type choices, press Enter.

 Device type . . . . . > *TRANSFORM *TRANSFORM, 3101, 3151...
 Manufacturer type and model . . . . . *IBM6404
 Source member  . . . . . SRC6404 Name
 Source file . . . . . QTXTSRC Name
 Library . . . . . *LIBL Name, *CURLIB, *LIBL
 Text 'description' . . . . . *BLANK
```

4. Use SEU to edit the table.

```
Start Source Entry Utility (STRSEU)

Type choices, press Enter.

 Source file . . . . . QTXTSRC Name, *PRV
 Library . . . . . QGPL Name, *LIBL, *CURLIB, *PRV
 Source member  . . . . . SRC6404 Name, *PRV, *SELECT
 Source type . . . . . *SAME Name, *SAME, BAS, BASP...
 Option . . . . . *BLANK    *BLANK, ' ', 2, 5, 6
 Text 'description' . . . . . *BLANK
```

5. Entering an SEU session will then give you a screen such as the following:

```
Columns . . . :  1 71      Edit                 QGPL/QTXTSRC

 SEU==>                                        SRC6404

 FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
********** Beginning of data **************************************

0000.01 :WSCST DEVCLASS=TRANSFORM.
0000.02
0000.03   :TRNSFRMTBL.
0000.04   :PRTDTASTRM
0000.05    DATASTREAM=IBMPPDS1.
0000.06   :INITPRT
0000.07    DATA ='11180D12141B461B481B4F1B541B55001B57001B35001B5F001B2D001B
0000.08   :RESETPRT
0000.09    DATA ='1B461B481B4F1B541B55001B57001B35001B5F001B2D00'X.
0000.10   :SPACE
0000.11    DATA ='20'X.
0000.12   :BSP
0000.13    DATA ='08'X.
0000.14   :CARRTN
0000.15    DATA ='0D'X.
0000.16   :FORMFEED
```

6. Use the SEU editor so that the table only contains the simple commands wanted.

```
Columns . . . :  1 71      Edit                 QGPL/QTXTSRC

 SEU==>                                       PTXPGL

 FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
*************** Beginning of data ************************************

0001.00 :WSCST DEVCLASS=TRANSFORM.
0002.00
0003.00   :TRNSFRMTBL.
0004.00   :RESETPRT
0005.00    DATA ='0C'X.
0006.00   :SPACE
0007.00    DATA ='20'X.
0008.00   :CARRTN
0009.00    DATA ='0D'X.
0010.00   :FORMFEED
0011.00    DATA ='0C'X.
0012.00   :LINEFEED
0013.00    DATA ='0A'X.
0014.00 :EWSCST.

****************** End of data ***************************************
```

In the modified table, '0C'X is an ASCII formfeed, 0C hex, for example. Save the modified member as PTXPGL, or some name you choose which identifies its function.

7. Create the WSCST object using the CRTWSCST command. This object will be called for either LPR or Queue print use.

8. Create an Output Queue using the WSCST Object, and printer destination “d1prn”. In this example the Output Queue is named “IP_P5000”.

```
Create Output Queue (CRTOUTQ)
 Type choices, press Enter.
 Output queue. . . . . . . . . . . . . . . . . . . . > IP_P5000   Name
  Library  . . . . . . . . . . . . . . . . . . . . . . *LIBL    Name, *LIBL, *CURLIB
 Maximum spooled file size:
  Number of pages . . . . . . . . . . . . . . . . . . *NONE     Number, *SAME, *NONE
  Starting time . . . . . . . . . . . . . . . . . . . Time
  Ending time  . . . . . . . . . . . . . . . . . . . . Time
       + for more values
 Order of files on queue . . . . . . . . . . . . . . *FIFO     *SAME, *JOBNBR, *FIFO
 Remote system . . . . . . . . . . . . . . . . . . . *INTNETADR
 Remote printer queue . . . . . . . . . . . . . . . 'd1prn'
 Writers to autostart . . . . . . . . . . . . . . . 1       1-10, *SAME, *NONE
                                More...
```

Notice that the entry for ‘Remote printer queue refers to the “queue”, or destination name in the PrintNet, and that we will autostart one Writer. This Writer is a “Remote Writer” since it is networked.

The last part (“More”) of the screen is:

```
Create Output Queue (CRTOUTQ)
 Type choices, press Enter.
 Queue for writer messages. . . . . . . . . . QSYSOPR    Name, *SAME
  Library . . . . . . . . . . . . . . . . . . . . . . . . *LIBL    Name, *LIBL, *CURLIB
 Connection type . . . . . . . . . . . . . . . . . . . . *IP      *SNA, *IP, *SAME
 Destination type . . . . . . . . . . . . . . . . . . . . *OTHER    *SAME, *OS400, *OS400V2...
```

Notice the entries for Connection type and Destination type (required). Since we chose to autostart one writer when the queue was formed, we should have a writer started by the name of IP_P5000. The command WRKWTR WTR(*ALL) may be used to see status of Remote writers (the WTR(*all) is required to see remote writers). The command to start our example remote writer is STRRMTWTR IP_P5000. The ENDWTR command works as usual.

At this point test the results by doing a print screen, and ensure that the output is as desired. If problems occur, be sure the correct data type is being used (no AFP or IPDS), and that the printer is set for the desired emulation.

Chapter 7 AS/400 Configuration

8 *Commands*

Command Shell Overview

The PrintNet comes with an in-depth command shell called "**npsh**." It allows you to manipulate objects like destinations, I/O ports, and models and provides monitoring and troubleshooting capabilities.

npsh Access Methods

There are many ways this command shell can be accessed:

- built in HTML forms
- a Telnet session from a TCP/IP host to the PrintNet
- a single remote shell command (i.e. rsh, rcmd, remsh) from a TCP/IP host

Main npsh Command Prefixes

All configurable commands either start with "**`store`**" or "**`set`**", troubleshooting commands usually start with "**`debug`**", and view commands start with "**`list`**".

NOTE: If the "**`store`**" prefix is used, the PrintNet must be repowered to make the changes take effect. Since "**`store`**" affects flash memory settings only, the print server must reset and read the new settings now in flash memory.

NOTE: If the "**`set`**" prefix is used, a "**`save`**" command must be executed as well so that the new settings are retained after power cycles. Since "**`set`**" only affects the settings in memory, they will be lost after a power cycle unless they are saved to flash memory.

Getting Command Help

The PrintNet command shell provides several online help tools. These include:

"?" Command

Typing "**?**" when logged in to the command shell will produce a full listing of all commands available.

Command Prefixes

Typing in the first portion of a command will produce an error message showing the correct syntax. For example, typing in "**`store tcpip`**" will produce a list of all commands that start with this prefix.

Complete Command List

This section outlines the entire PrintNet command set including the command syntax, a description, and in most cases, an example for each command listed.

NOTE: If you see the word "***ifnum***" in any npsh commands, you should substitute a "**1**" unless told otherwise. This "**1**" represents the one network interface (i.e. Ethernet) supported.

store Commands

These commands change the settings stored in flash memory and do not affect the current or working settings in memory. A power cycle is needed before the stored settings become current.

`store ifc` *`ifnum`* `utp [-]li [-]rx`
`store ifc 1 utp li`

Modify the physical UTP interface properties where **li** enables link integrity and **rx** enables the increased receive threshold.

`store ifc from default`

Set all UTP settings back to factory defaults.

`store ifc from current`

Store all current UTP settings to flash memory so they are retained after a power cycle. This ensures all current settings match what is stored in flash memory.

`store pserver opts [[-]jobsecurity] [jobtimeout` ***`seconds`*****`]`**
`store pserver opts jobsecurity jobtimeout 5`

If **jobsecurity** is disabled, any user can cancel queued jobs on the PrintNet including guest users. If **jobtimeout** is set to some value other than 0, the PrintNet will only wait this amount of ***seconds*** when getting printer feedback. This is only used if you have a logpath port and type set on a particular destination.

store pserver tcpsocket *TCPportnumber* port *newTCPportnumber*

store pserver tcpsocket 4000 port 5000

Change a pre-defined ***TCPportnumber*** on the PrintNet to a ***newTCPportnumber***. The default numbers are 9100 for prn.

store pserver tcpsocket *TCPportnumber* dest *destination*

store pserver tcpsocket 5000 dest d1prn

Assign a pre-defined ***TCPportnumber*** to a particular ***destination*** on the PrintNet. Therefore, if you are using a print method that sends jobs directly to a TCP port number, you still have the option to process the job data through this destination setting.

store pserver novell passwd *password*

store pserver novell passwd mplex

Store the ***password*** for the PrintNet to use when logging in to a Novell file server. This ***password*** would have to match one set on the file server.

store pserver novell user name *username*

store pserver novell user name micro1

Define a ***username*** on the PrintNet to be used when it logs into a Novell file server to find information. This ***username*** must match a user pre-defined on the Novell file server.

store pserver novell user passwd *password*

store pserver novell user passwd mplex2

Define a ***password*** on the PrintNet for the Novell user already defined. This ***password*** must match the one stored on the Novell file server. Passwords are optional as long as there is not one defined on the file server for the user.

store pserver novell fserver add|del *fileservername*

store pserver novell fserver add fs1

Add or remove a server entry on the PrintNet for the Novell file server it will be servicing.

store pserver smb workgrp *newworkgroupname*
store pserver smb workgrp eng

Define a different Windows workgroup as defined by ***newworkgroupname*** for the PrintNet to be visible within. By default, the print server only comes up within the group called "WORKGROUP."

store pserver from default

Set all general print server settings back to factory defaults.

store pserver from current

Store all current general print server settings to flash memory so they are retained after a power cycle. This ensures all current settings match what is stored in flash memory.

store rprinter add|del *printservername printernumber destination*
store rprinter add pserver1 0 d1prn

Add or delete the RPRINTER settings on the PrintNet for a Novell environment. The ***printservername*** must be the name of an existing PSERVER.NLM on your Novell file server. The ***printernumber*** is the printer number within this PSERVER.NLM. The ***destination*** is the queue on the PrintNet where the print jobs will be sent to.

store tcpip *ifnum* addr *IPaddress*
store tcpip 1 addr 192.75.11.9

Store the IP address for the PrintNet.

store tcpip *ifnum* mask *netmask*
store tcpip 1 mask 255.255.255.0

Store the subnet mask for the PrintNet.

store tcpip *ifnum* opts [[-]rarp] [[-]bootp]
store tcpip 1 opts -rarp -bootp

Enable or disable the automatic RARP and BOOTP requests for IP addresses upon bootup. If you are storing the PrintNet TCP/IP network settings within the device, you will not need to rely on RARP or BOOTP for new settings.

store tcpip *ifnum* frametype [[-]ethernet2] [[-]802.2snap]

store tcpip 1 frametype ethernet2 802.2snap

Control which frame type(s) is supported with the TCP/IP protocol. By default, both **Ethernet 2** and **802.2snap** are enabled but normal TCP/IP communications rely on Ethernet 2. This setting has no affect on other supported network protocols (e.g. Novell).

store tcpip route add|del host|net *IPaddress ifnum*

store tcpip route add net 192.75.12.0 1

store tcpip route del net 192.75.12.9 1

Add or delete a static route to a particular TCP/IP host or subnet specified by ***IPaddress*** so the PrintNet knows how to communicate with it. Normally one entry for a default router/gateway is all that is needed for communications between different subnets. Please see the next command for details.

store tcpip route add|del default *routerIPaddress ifnum*

store tcpip route add default 192.75.11.1 1

Store a default router/gateway defined by ***routerIPaddress*** so the PrintNet knows where to direct packets destined for another subnet. It is easier to store one default entry rather than an entry per remote host or network as in the previous command.

store tcpip tcp rxwin *packets*

store tcpip tcp rxwin 2

Determine the receive window size for the PrintNet. Usually the ***packets*** value ranges from 2 to 8 with the lower number allowing for more simultaneous TCP connections with the print server.

store tcpip tcp opts [-]keepalive [-]disbufmgmt
store tcpip tcp opts keepalive -disbufmgmt

Control whether the PrintNet maintains a connection with a host when data can not be accepted into its buffer. Normally the **keepalive** feature is enabled so when the printer can not accept data, the print job connection is maintained and continued once the situation clears. If **disbufmgmt** is disabled (i.e. "-"), the PrintNet will not buffer any data when there is a blocked situation with the printer. Normally it is best to have both **keepalive** and **disbufmgmt** enabled.

store tcpip tcp access [root] add|del *IPaddress*
store tcpip tcp access add 192.75.11.25

Add or remove an entry from the PrintNet TCP access list defined by ***IPaddress***. If the list has an entry, only this host can print to and remotely interact with the print server.

store tcpip proxy add|del *targetIPaddress*
store tcpip from default

Set all TCP/IP network settings back to factory defaults.

store tcpip from current

Store all current TCP/IP network settings to flash memory so they are retained after a power cycle. This ensures all current settings match what is stored in flash memory.

set Commands

These settings alter the current or working settings in memory only. Therefore, they will be lost if the PrintNet is power cycled. To ensure this does not happen, be sure to issue a "**save**" command so the current settings get written to flash memory.

set date *year month day*
set date 1997 02 10

Set the current date noting the four-digit **year**, the two-digit **month** from 1 through 12, and the **day** being the number in the month. If the PrintNet is reset, this value will be lost so you will need to set the date again.

set dest *destination* name *newname*
set dest d1prn name laser

Change the current name of the ***destination*** to a new name as indicated by ***newname***. This ***newname*** must be nine characters or less or it will be truncated. These names are case sensitive.

set dest *destination* backchannel prn [prn]
set dest d1prn backchannel prn

Establish a return path for printer feedback for a given ***destination***. Since the PrintNet I/O port is bi-directional, however, you will most likely use the same I/O port that the ***destination*** is currently sending jobs to.

set dest *destination* model *modelname*
set dest d1prn model m4

Associate a model with a destination. Jobs sent to the named ***destination*** are processed according to the options defined in the named model.

set dest *destination* logpath *logpathname*
set dest d1prn logpath l4

Associate a logpath with a destination. Jobs sent to the named ***destination*** are logged according to the settings defined in the named logpath.

set dest *destination* service [[-]socket][[-]lpd] [[-]lpsched] [[-]rprinter] [[-]pserver] [[-]netbios] [[-]ftpd]
set dest d1prn service -netbios

Set the ***destination*** to handle only certain print services. To add a service, specify the service name. To disable a service, use "**-**" before the name. The available services are:

socket	Direct socket printing via TCP/IP.
lpd	LPR printing with TCP/IP including LPR clients on any platform.
lpsched	LP or System V printing with TCP/IP.
rprinter	Novell RPRINTER support.
pserver	Novell PSERVER support.

netbios Windows 95 and Windows for Workgroups printing.

ftpd Printing using the File Transfer Protocol (FTP) via TCP/IP.

`set dest from default`

Set all destination settings back to factory defaults.

`set dest from stored`

Set all current destination settings to the values stored in flash memory.

`set logpath logpath name newname`
`set logpath l1 name pagecount`

Change the current name of the ***logpath*** to a new name as indicated by ***newname***. This ***newname*** must be nine characters or less or it will be truncated. These names are case sensitive.

`set logpath logpath type [[-]job] [[-]user] [[-]pgcnt] [[-]cksum] [[-]printer] [[-]ioport]`
`set logpath l2 type job user printer pgcnt`

Establish the type of printer and print job logging to be done within this **logpath**. The options are:

job Job ID, username, etc.

user User ID along with three messages per job about start and finish.

cksum 16-bit checksum value to confirm integrity of data printed.

ioport Printer error messages determined through the parallel port pins.

`set logpath logpath port TCPportnumber| email|syslog`
`set logpath l3 port 2000`

Determine where the log information should be sent for a print job or attached printer. The choices are:

TCPportnumber TCP port number ranging from 1024 to 65000.

email Particular user's email address. This address is set using the "**set sysinfo email *emailname@IPaddress***" command.

syslog A central TCP/IP host running the SYSLOG daemon. This host is set using the "**set sysinfo syslog *IPaddress***" command.

`set logpath from default`

Set all logpath settings back to factory defaults.

`set logpath from stored`

Set all current logpath settings to the values stored in flash memory.

`set model *model* name *newname*`

`set model m1 name landscape`

Change the current name of the ***model*** to a new name as indicated by ***newname***. This ***newname*** must be nine characters or less or it will be truncated. These names are case sensitive.

`set model *model* type raw`

`set model m2 type raw`

Set the model **type** to **raw** so that it does not process the data passing through it in any way.

`set model *model* banner [ps|text|auto [after]]`

`set model m2 banner text`

Determine whether a banner page should be added for print jobs passing through the ***model*** mapped destination/queue. **auto** will determine which type is needed depending on the type of print job data passing through. By default, banner pages are added to the front of the job. If **after** is set, the banner page will come at the end.

`set model *model* stty [[-]onlcr] [[-]descramble] [xtab *tablength*|none]`

`set model m3 stty onlcr`

Control extra job processing done by the ***model***. The processing options are:

onlcr Carriage return insertion for Unix text jobs. Adds carriage returns to text jobs with solitary linefeeds. This will prevent stair-stepped output or output running off the right side of the page.

descramble	Automatic descrambling of print jobs passing through which have been scrambled using Printronix proprietary scramble Unix utility, **npscramble**.
xtab	Tab expansion from 1 to 16 spaces.

set model *model* trailer *trailerstring*
set model m7 trailer $FF

Set a trailer string to be sent to the printer at the end of any print jobs passing through this ***model***. ***trailerstring*** can consist of up to nine elements. An example element is a hexadecimal code (e.g. 0x04) or a pre-defined variable on the print server (e.g. $FF for a formfeed). Use "***list var***" to see all available variables.

set model from default

Set all model settings back to factory defaults.

set model from stored

Set all current model settings to the values stored in flash memory.

set prn [-]autofd
set prn -autofd

Assert or do not assert the AUTOFD line for carriage return insertion. This only affects printers that support this function such as impact printers.

set prn flush
set prn flush

Flush the data in the parallel port input and output buffers.

set prn unlock
set prn unlock

Release the access lock on the parallel port.

set prn timeout *minutes* |none
set prn timeout none

Terminate the print job sent to the parallel port if it is not printed after the timeout period in ***minutes*** expires. The ***minutes*** value ranges from 0 though 255 with 0 indicating no timing out to take place. This is the default setting and should be fine for most print setups.

set prn [-]opost
set prn -opost

Allow or disallow output processing on the parallel port such as carriage return insertion (i.e. onlcr).

set prn [-]onlcr
set prn -onlcr

Enable or disable carriage return insertion on the parallel port. This may be needed for Unix text jobs coming through with solitary linefeeds. This feature is almost always set at the model level rather than the I/O port level though.

set prn xtab *tablength* |none
set prn xtab none

Set the tabstop width as indicated by ***tablength***. The range is 1 through 16 spaces.

set prn from default

Set all parallel port settings back to factory defaults.

set prn from stored

Set all current parallel port settings to the values stored in flash memory.

set sysinfo name *newname*
set sysinfo name salesprinter

Set a descriptive name defined by ***newname*** for PrintNet identification purposes. This is not used in the operation of the print server in any way.

set sysinfo location *description*
set sysinfo location salesdept

Set the physical location of the PrintNet. This is for identification purposes and is not used in the operation of the print server in any way.

set sysinfo contact *contactname*
set sysinfo contact Paul_Harris

Set a person or department to contact in case of print server trouble.

`set sysinfo loginfo [-]sys | [-]tcp | [-]ipx | [-]spx`
`set sysinfo loginfo -sys ipx`

Set the PrintNet debugging information type. Usually this information includes unexpected errors or exceptions from the print server divided into these groups:

sys	General system messages.
tcp	TCP stack messages.
ipx	IPX stack messages.
spx	SPX stack messages.

NOTE: This is not printer or job logging information.

`set sysinfo logport null|syslog`
`set sysinfo logport null`

Define where the debugging information should be sent to. This can be sent to an output device off of the PrintNet I/O port or to a central TCP/IP host running a SYSLOG daemon. To set this host, use the command "**`set sysinfo syslog hostIPaddress`**".

`set sysinfo email` ***`emailname@IPaddress`***
`set sysinfo email joe@192.75.11.5`

Define the user email address to receive printer and job logging information from a particular logpath on the PrintNet. ***emailname*** is the host or IP name of the user and ***IPaddress*** is the IP address where the mail is stored on your network.

`set sysinfo syslog` ***`hostIPaddress`***
`set sysinfo syslog 192.75.11.30`

Set the IP address of the host running the SYSLOG daemon. PrintNet debugging or print job and printer logging information can be sent to that IP address.

`set sysinfo dns` ***`DNSserverIPaddress`***
`set sysinfo dns 192.75.11.2`

Set your DNS server IP address so the PrintNet can resolve host names when used with its built-in Telnet and Ping clients.

set sysinfo descramblekey *hexvalue*
set sysinfo descramblekey 1234

Set the key value used for descrambling print jobs that have passed through Printronix **npscramble** utility on a TCP/IP host. This key is a four-digit hexadecimal value obtained from the host software, npscramble. Within the npscramble source code, there is a variable called SR_KEY which contains the default key value. This can be changed to any four-digit value you would like.

set sysinfo module [[-]novell] [[-]netbios]
set sysinfo module -novell

Enable and disable certain network protocol stacks within the PrintNet. Sometimes it helps to disable any protocols you are not using on your network.

set time *hours* [*minutes* [*seconds*]]
set time 10 30

Set the current time noting the ***hours*** based on the 24-hour system and the ***minutes*** and ***seconds*** ranging from 0 through 59. If the PrintNet is reset, this value will be lost so you will need to set the time again.

set user add|del *username*
set user add eng

Add or remove a user on the PrintNet defined by ***username***.

IMPORTANT **Be careful not to delete the root user, or you will be unable to configure any further settings on the print server. You will have to go back to factory defaults to correct this problem.**

set user passwd *username password*
set user passwd eng mplex1

Assign a ***password*** to a defined user on the PrintNet. This ***password*** must be less than eleven characters.

set user type *username* root|guest
set user type eng root

Assign root or guest privileges to a particular user defined by ***username***. Guest permissions allow viewing of settings only. Root permissions allow complete control of the PrintNet.

`set user from default`

Set all user settings back to factory defaults.

`set user from stored`

Set all current user settings to the values stored in flash memory.

`set var variablename variablestring`
`set var LANDSCAPE 0x1b 0x26 0x6c 0x31 0x4f`
`set var FINISH $FF $PCL-RST`

Define a new variable to be used in header, trailer, or switch strings on the PrintNet and call it ***variablename***. ***variablestring*** can be a space-separated list of words, hexadecimal numbers (e.g. 0x04), or references to other pre-defined variables. It is easiest to make up the ***variablestring*** with hexadecimal values as shown in the example.

NOTE: One variable counts as one element within header and trailer strings.

NOTE: Defined variables are referenced in strings by placing a "**$**" before the variable name (e.g. "**`set model m1 trailer $FF`**").

`set var from default`

Set all variable settings back to factory defaults.

`set var from stored`

Set all current variable settings to the values stored in flash memory.

list Commands

These commands list the current or working settings for a particular section within the command shell. To view stored settings in flash memory, you will need to add in "**`stored`**" within the beginning of any of the following commands. For example, "**`list prn`**" shows you the current prn settings but "**`list stored prn`**" shows you the settings sitting in flash memory. Normally these should match.

`list tcpip`

List all current TCP/IP network settings (e.g. IP address and subnet mask).

`list pserver`

List the current general print server settings (e.g. print server name and Novell mode).

`list dest`

List the current destination settings (e.g. names and mapped I/O ports, models, and logpaths).

`list model`

List the current model settings (e.g. names and mapped destinations).

`list logpath`

List the current logpath settings (e.g. names and mapped destinations).

`list prn`

List the current parallel port setting (e.g. mode).

`list sysinfo`

List the current PrintNet system information (e.g. contact name and protocol stacks enabled).

`list ifc`

List the current UTP interface settings (e.g. link integrity).

`list user`

List the current user definitions (e.g. user names and types).

`list logins`

List any active user logins on the PrintNet.

`list arp`

List the current ARP table that the PrintNet adheres to in a TCP/IP network.

`list var`

List all pre-defined variables including any newly created ones. Any of these defined variables can be referenced in a string by placing a "**`$`**" before the variable name (e.g. "**`set model m1 trailer $FF`**").

`list rprinter`

List any current RPRINTER definitions.

`list time`

List the current time on the PrintNet.

`list date`

List the current date on the PrintNet.

`list test`

List the status of output tests on the I/O ports.

`list key`

List the license details and license key number.

`list diff`

List the differences between the current settings and the stored settings in flash memory. Normally, you want these values to match so issue a "**`save`**" command followed by a "**`reset`**".

debug Commands

The "**`debug`**" set of commands help troubleshoot problems that may occur on the PrintNet. Some of the output may be cryptic but it helps when troubleshooting.

`debug tcp`

List TCP stack statistics.

`debug ip`

List IP stack statistics.

`debug netbios`

List NetBIOS (i.e. Windows 95 and WfW) statistics.

`debug mem`

List statistics from the PrintNet memory module.

`debug lpq`

List statistics from the queue module.

`debug io`

List statistics from the I/O port module.

`debug eeprom`

List ROM contents.

`debug nif`

List network interface statistics.

Miscellaneous Commands

These commands do not fall under any specific section of the command shell but they are used quite frequently.

`save [default]`

Save the current settings to flash memory so they are available after power cycles. Sysinfo, destination, model, logpath, variable, user, and I/O port settings will be saved. If **`default`** is specified as well, factory settings will be saved, overwriting any new settings you have configured.

`reset`

Perform a warm boot or hardware reset simulating a power-on reset. Restores current settings to those stored in flash memory since the flash memory settings will be read and loaded into memory upon bootup.

`load [default]`

Load the settings stored in flash memory and use them as the current or working settings. If **default** is specified as well, factory settings will be loaded.

`lpstat [`*`ioport`*`] [`*`jobID`*`]`
`lpstat prn`

Display active and queued jobs and I/O port status for a given ***ioport*** or ***jobID***. Specifying one of these parameters will shorten the output focusing on the particular I/O port or print job specified.

`cancel `*`jobID`*
`cancel d1prn-10`

Remove a job from an I/O port queue. Use "**`lpstat`**" to find a particular job ID first.

`start fox|tts|loopb prn`
`start fox prn`

Begin a debugging test on one of the I/O ports on the PrintNet. The tests available are:

fox	A continuous stream of text sent to the attached printer. This is a good test for troubleshooting hardware as long as the attached printer supports text output.
tts	A continuous stream of Gandalf 400C TTS-compatible text sent to the attached printer.
loopb	Loopback test. Any input characters from the device attached to the I/O port is echoed back.

`stop prn`
`stop prn`

Stop an output test on an I/O port.

`disable ioport|destination`
`disable prn`

Disable an ***I/O port*** so that queued jobs are not printed, or disable a ***destination*** so jobs can not be queued to it.

`enable ioport|destination`
`enable prn`

Enable an ***I/O port*** so that queued jobs are printed, or enable a ***destination*** so jobs can be queued to it.

`close tcp TCPindexnumber`
`close tcp 3`

Force a TCP/IP connection between a TCP/IP host and the PrintNet to close. The ***TCPindexnumber*** can be retrieved from “debug tcp” output.

`ping [-s] hostIPaddress [datasize [packetnumber]]`
`ping 192.75.11.30`

"**`ping`**" another TCP/IP host specified by ***hostIPaddress*** on the PrintNet network. ***datasize*** is the datagram packet size which defaults to 64 bytes if no size is included in the syntax and ***packetnumber*** is the number of requests to be sent.

NOTE: To use a host or IP name instead of the address, you must have set the DNS server on the PrintNet. Use the command "set sysinfo dns..." to do this.

`telnet hostIPaddress [escapecharacter]`
`telnet 192.75.11.35`

Start a Telnet session with another TCP/IP host specified by ***hostIPaddress*** on the PrintNet network. If ***escapecharacter*** is used, it resets the key sequence used to exit the Telnet session. It will return you to the telnet> prompt where you can execute "***quit***". Use the "***keycode***" command to find out exact escape characters if needed. The default character is CTRL-].

NOTE: To use a host or IP name instead of the address, you must have set the DNS server on the PrintNet. Use the command "**`set sysinfo dns...`**" to do this.

`chr string`

Echo ***string*** or redirect ***string*** to an I/O port using "**`chr string > ioport`**".

`keycode`

Determine the hexadecimal value for a key to be used as the escape character with the PrintNet built-in "**`telnet`**" command.

9 *Extra Features*

PrintNet Security

There are TCP access lists available to restrict host connections with the device.

Users and Passwords

The PrintNet supports two user types:

root	Access to everything within the print server including all configurable settings.
guest	Ability to list settings only.

Passwords can be set for each user type. However, most often you would just set a password for the root user to protect the PrintNet configuration. Guest users can not alter the print server configuration in any way.

To configure a root password on your PrintNet:

1. Load a Web browser on a network station that can communicate with the print server over TCP/IP. The commands to set a root password are:

Syntax:

`set user passwd` ***`username password`***
`save`

Example:

```
set user passwd root your_password_for_root
save
```

2. Direct your Web browser to URL "**http://*PrintNetIPaddress*/adminConf.html**" (e.g. "**http://192.75.11.9/adminConf.html**").

NOTE: If prompted for a "User ID" and password first, type in "**root**" for the user ID and press ENTER at the password prompt since there is no password by default.

3. At the "Administration Configuration" HTML form that displays, scroll down to the "Passwords" section.
4. Click within the "Old" field beside the "Root Password" heading and enter the existing root password. By default, there is no root password so you can go to the next step without typing anything in this field.
5. Within the "Root Password" section, click within the "New" field and enter the new root password.
6. Within the "Root Password" section, click within the "Confirm" field and enter the new root password again. Remember this is case sensitive.
7. Click on the SUBMIT button when done and physically repower the print server to make the new setting takes effect.

From this point on, anytime you log in to the PrintNet as "**root**", you will need to specify this password or your login attempt will fail.

NOTE: To clear this password or change it, use the same "Administration Configuration" HTML form. Just enter the appropriate "Old" password and put in the new one (or nothing if you do not want a root password any longer). The commands directly on the PrintNet are:

```
set user from default
save
```

TCP Access Lists

Within TCP/IP environments, the PrintNet can restrict host access to destinations/queues and remote command (i.e. rsh, rcmd, remsh and telnet) execution services. This is done using an access list similar in function to the Unix .rhosts file.

To view the current access list on the print server:

NOTE: Access list settings are not configurable through the HTML forms provided with the PrintNet.

1. Start a Telnet session with the PrintNet.

Syntax:

`telnet` ***`PrintNetIPaddress`***

2. Log in as "**`root`**" and press ENTER at the password prompt since there is no password by default (or your password for your home set).

3. List the current access list.

Syntax:

`List tcpip`

If the list is empty, all hosts have access to the PrintNet services. If there are entries in the list, only those hosts specified have access to printing and remote command execution.

To add and delete access list entries, the commands are:

Syntax:

`store tcpip tcp access add|del` ***`hostIPaddress`*****`|`**
`networkaddress`
`reset`

where ***hostIPaddress*** is the IP address of a TCP/IP host on your network and ***networkaddress*** is the address of a subnet on your network.

Example:

```
store tcpip tcp access add 192.75.11.25
store tcpip tcp access add 192.75.12.0
store tcpip tcp access del 192.75.11.25
reset
```

NOTE: Although the maximum number of entries in the access list is 10, each entry can refer to a network rather than a specific host. This allows all hosts on that specified network to have access plus any individual hosts specified in the list.

Printer Monitoring and Logging

One of the key aspects of maintaining a computing environment is monitoring printer status and logging this information to useful places. The PrintNet allows this through its built-in HTML forms, command set, and logpaths.

Printer and Print Job Monitoring

To view the current status of an I/O port on the PrintNet, two methods are available:

1. Selecting the desired I/O port on the “Status” HTML form (i.e. “**`http://PrintNetIPaddress/indexStatus.html`**”; e.g. “**`http://192.75.11.9/indexStatus.html`**”) that comes with the PrintNet.
2. “**`lpstat`**” command directly on the print server once logged in as “**`guest`**” or “**`root`**”.

In each case, you are given a description of each I/O port status and a list of queued jobs. Table 4 describes some of the common terms you may encounter.

Table 4. Key Printer Logging Terms

Term	Description
“idle”	There is no job queued for the PrintNet I/O port.
“blocked”	The printer is not allowing the PrintNet to send data to it. Check that there is not a printer error and it is online and ready to go.
“waiting”	The PrintNet knows about a print job but is waiting for the host to send more data or to send an expected packet.

Printer Logging Through Logpaths

In the PrintNet product manual, destinations are described as logical queues with associated models and logpaths. Models determine if any extra processing is needed with the print jobs passing through and logpaths determine whether any logging is needed for each job.

Each logpath on the PrintNet consists of two parts:

Type The type of log information to be captured. The choices are “**`job`**” for job ID and username, “**`user`**” for user ID (and three messages per job), “**`pgcnt`**” for total pages printed in a job, “**`cksum`**” for file checksums, “**`printer`**” for special printer feedback, and “**`ioport`**” for parallel printer status messages.

Port Where this log information will be sent to. The choices are a **TCP port number** (e.g. 2000), an **email address** (including an alias), a central host running a **SYSLOG daemon**.

To view the current logpath settings on the print server:

1. Load a Web browser on a network station that can communicate with the print server over TCP/IP or using Telnet (e.g. Telnet “ipaddress”). The command to view the logpath settings is:

NOTE: If prompted for a “User ID” and password first, type in “**`root`**” for the ID and press ENTER at the password prompt since there is no password by default.

Syntax:

`list logpath`

2. Direct your Web browser to URL “**`http://`*`PrintNetIPaddress`*`/destConf.html`**” (e.g. “**`http://192.75.11.9/destConf.html`**”).

NOTE: If prompted for a “User ID” and password first, type in “**`root`**” for the ID and press ENTER at the password prompt since there is no password by default.

3. At the “Print Path Configuration” HTML form that displays, select a destination link (e.g. d1prn1) from the top of the page to bring up the appropriate destination form.

4. Once the desired destination HTML form displays, scroll down to the “Logpath Type” and “Logpath Port” sections to view the current logpath settings for this particular destination.

At this point, you can alter any of these settings and then click on the SUBMIT button to store them into the PrintNet. Remember to repower the PrintNet to make the settings take effect.

Downloading Software

Emulation and operating system software must be loaded into flash memory on the controller board. This software is stored as a compressed file on a 3.5 inch, double-density floppy diskette. The software can be downloaded from the host computer to the printer's flash memory using PrintNet.

Procedure

1. Make a printout of *all* saved configurations. (Refer to the *User's Manual*.) (Installing new software erases all saved configurations. You will use the printouts to restore printer configuration.)
2. Set the printer power switch to O (off).
3. On the printer control panel, press and hold down the **ONLINE + PAPER ADVANCE** keys. Without releasing the keys, power the printer on. Continue holding the **ONLINE + PAPER ADVANCE** keys down.
4. When you see "WAITING FOR PROGRAM DOWNLOAD" on the LCD, release the **ONLINE + PAPER ADVANCE** keys.
5. On the host computer, create a temporary directory called "download" on the **`c:`** drive. From an MS-DOS prompt, type:

   `md c:\download` <Return>
6. Insert the emulation or upgrade diskette into diskette drive A (or B) of the personal computer.
7. Make the diskette drive the active drive by typing the following at the DOS prompt:

   `A:` <Return>

   (If the diskette is in drive B, type **`B:`** <Return>)

8. Get the name of the compressed file on the diskette by listing the contents of the diskette; at the DOS prompt type:

   DIR <Return>

   The compressed file on the diskette takes the form *FILENAME.EXE*

9. Copy the compressed file to the “download” directory you created in step 5; at the DOS prompt type:

   copy FILENAME.EXE c:\download <Return>
   where *FILENAME.EXE* is the name of the file contained on the diskette.

10. Make the “download” directory the active directory; at the DOS prompt, type:

    c:\download <Return>

11. Decompress the executable file on the hard drive; at the DOS prompt, type:

    FILENAME.EXE <Return>
    This will create a file called *FILENAME.PRG* inside the “download” directory.

12. Start the FTP protocol; at the DOS prompt, type:

    ftp xxx.xxx.xxx.xxx <Return>
    (where xxx.xxx.xxx.xxx represents the IP Address of the printer.)

13. Log in to the printer; at the prompt, type:

    root <Return>

    You are given a password prompt. The default is no password; at the password prompt, enter <Return>. If the FTP program requires a password, contact your system administrator.

14. Once logged in, type the following sequence at the DOS prompt to download the *FILENAME.PRG* file to the printer:

    cd dest <Return>
    cd d1prn <Return>
    bin <Return>
    put FILENAME.PRG <Return>
    (where *FILENAME.PRG* is the name of the file decompressed in step 11.)

15. As the file downloads, the FTP program shows the progress as a percentage. Once the download is complete, exit out of the FTP program by typing:

    quit <Return>

16. When the new program has successfully loaded into flash memory and the printer has reset itself, set the printer power switch to O (off).
17. Unplug the AC power cord from the printer.
18. Remove the diskette from the personal computer and store it with the printer.
19. Power off the personal computer.
20. Using the configuration printout(s), reconfigure the printer. (Refer to the *User's Manual.)*

PrintNet Naming Schemes

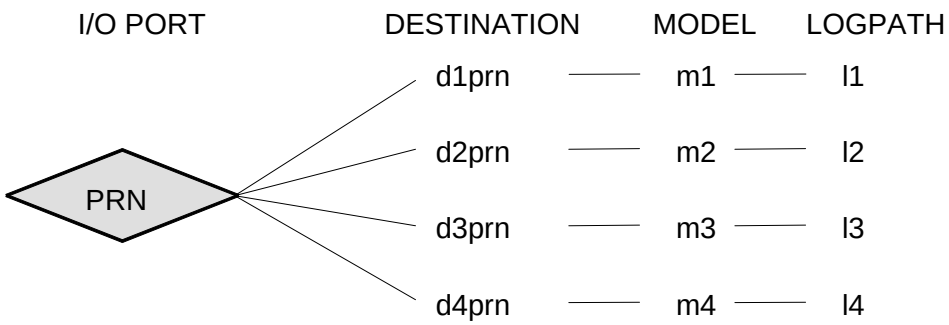

Figure 20. PrintNet Default Names

10 *Glossary*

ARP	Address Resolution Protocol. Associates a selected IP address with a network device Ethernet address.
bps	Bits per second.
Centronics	Parallel port interface standard found on most printers.
daemon	A continuously running process that handles system-wide functions like print spooling.
default router	Local device that forwards any IP packets destined for another subnet.
destination	Logical print queue on the PrintNet which hosts send their print jobs to. There are eight destinations (two per I/O port) by default.
DHCP	Dynamic Host Configuration Protocol. Allows a network device to discover its IP address dynamically upon bootup. The IP address does not need to be stored within the device itself permanently.
Download Mode	Refers to the condition of the PrintNet when in a startup condition, downloading configuration information.
DNS	Domain Name Server. Host providing responses to queries for a given host name IP address.
EEPROM	Electrically Erasable/Programmable Read-Only Memory.
factory defaults	Settings shipped with the PrintNet.

Factory Settings	S2 jumper position stating all factory default settings are to be used while the PrintNet is up and running.
Firmware Panic	Unrecoverable errors detected by the PrintNet firmware force the Print Server into Firmware Panic mode. Manually reset the PrintNet to resume operation.
Flash	Stores firmware code and configurable settings. Allows for upgrades without replacing hardware inside the PrintNet.
FTP	File Transfer Protocol. Used for transferring files from one TCP/IP host to another and used in the upgrade process.
Hardware Exception	Buss errors, address errors, and illegal instructions force the PrintNet into this non-operational mode.
HTML	HyperText Markup Language. Format used for documents viewable on the World Wide Web.
ifnum	Interface Number. Represents the network interface. With a PrintNet, this will always be “1” for Ethernet.
interface script	Unix host filter file that processes the print job before it is sent over the network to the PrintNet.
I/O port	Port for attaching peripherals to. The PrintNet provides four: PRN1, PRN2, COM1, COM2.
IP Address	The Internet Protocol Address. A numeric address such as 123.45.61.23 which identifies a printer or server in a LAN or WAN.
LAN	Local Area Network.
LED	Light Emitting Diode. The printer has an LED display which shows the status of the printer to the operator.

logpath	Determines type of print job and printer logging needed per job. One logpath is associated with every destination.
LPD/LPR	Line Printer Daemon. The most common TCP/IP remote printing protocol that crosses all hardware utilizing IP.
MIB	Management Information Base. A set of variables (database) managed by an SNMP manager application.
model	Defines how a print job should be processed (e.g. banner pages added, ASCII to PostScript conversion) as it passes through the PrintNet. One model is associated with every destination.
NetBIOS	Network Basic Input Output System. Common interface among PC networks.
Monitor Mode	Refers to the condition of the PrintNet with no configuration or IP address loaded.
npsh	Extensive built-in command shell within the PrintNet.
PDF	Portable Document Format. Encodes different types of documents enabling them to be read across multiple platforms.
ping	Standard command to test a TCP/IP connection. (e.g. “`ping 192.75.11.9`”)
print path	Three-stage path a print job takes when it is sent from a host to a printer through the PrintNet.

protocol	A set of rules or conventions governing the exchange of information between computer systems, or between a printer and a host computer. For computer printers, a protocol is the coding convention used to convey and print data. A printer protocol includes codes for printing text and graphics, as well as codes instructing the printer to perform special operations, and machine-to-machine communication codes.
PSERVER	Print Server. A Novell print method where the PrintNet continuously polls the Novell file server print queue looking for print jobs.
RAM	Random Access Memory. Volatile memory within the PrintNet that contains current/working settings. Settings are lost once the power is removed.
RARP	Reverse Address Resolution Protocol. Allows a network device to discover its IP address dynamically upon bootup. The IP address does not need to be stored within the device itself permanently.
ROM	Read-Only Memory.
router	A device that forwards IP packets to their destination. Also called a gateway.
RPRINTER	Remote Printer. A Novell print method where the PrintNet waits for jobs to be sent to it from a defined PSERVER.
SNMP	Simple Network Management Protocol. A standard protocol used to monitor network devices called “SNMP agents.”
socket	TCP connection between two hosts consisting of a source and destination TCP port number at each end.

subnet mask	A binary value used to divide IP networks into smaller sub-networks or subnets. This mask is used to help determine whether IP packets need to be forwarded on to other subnets.
TCP/IP	Transmission Control Protocol/Internet Protocol. Suite of protocols that act as the base protocol for the Internet.
TCP port	A logical connection point in the software of a TCP host or device. When two IP devices talk, they establish a socket which consists of a source and destination TCP port number on both ends.
telnet	Command and protocol to establish a terminal connection between two hosts on an IP network.
UTP	Unshielded Twisted Pair. A cable used for telephone and computer-to-computer connections.
WAN	Wide Area Network.

Chapter 10

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